The UNESCO Courier

A window open on the world

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EXPLORING THE NEW SOUNDSCAPE

TREASURES OF WORLD ART

114

Hungary

Siren-borne candlestick

The siren, a fabulous creature —half woman, half bird—originating in ancient Oriental mythology, inspired a Hungarian craftsman to create this graceful bronze candlestick (20 cm high) some 700 years ago. Metalwork was a flourishing art in Hungary at the beginning of the 11th century A.D. and from then until the early 16th century Hungarian craftsmen working in gold, silver, bronze and copper wrought a profusion of jewelry, plate and cult objects, bringing to perfection a technique of filigree enamelling that came to be imitated all over Europe.

Photo © Hungarian National Museum, Budapest

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The scientific exploration of our acoustic environment—the "soundscape"—has recently begun. Noise and sound are indeed as much a part of our lives as shapes and colours, although our modern world of sound is very different from that of our ancestors. The "World Soundscape Project" set up and directed by the Canadian composer R. Murray Schafer is today studying the innumerable sounds in our acoustic environment (see page 4). Here, child with a sea shell listens intently for the sound of waves upon the sea-shore.

Photo © Roger Canessa, Toulon, France

Photo © Christian Dobbelaere, Brussels

EXPLORING THE NEW SOUNDSCAPE

Pioneer research into the global acoustic environment

by R. Murray Schafer

R. MURRAY SCHAFER, *internationally known Canadian composer, is founder and director of the World Soundscape Project in Vancouver. Until 1975 he was professor of Communication Studies at Simon Fraser University, British Columbia (Canada). A complete treatment of the subject of this article is presented in his book* The Tuning of the World, *a study dealing with all aspects of the world soundscape which will be published shortly by Alfred A. Knopf in New York and McLelland and Stewart in Toronto, Canada.*

MOST Europeans and North Americans still believe that the eye is the most important receiver of information. I have heard psychologists say that as much as 80 per cent of our vital information comes through this receiver. Very few people stop to consider that this may not have been true in the past, or that it may not be true in the future, and that it may not even be true for much of the world's population at present.

We are coming to believe that dependence on the eye as the gatherer and orderer of environmental information is directly related to literacy and is therefore a habit that has been learned by Westerners as far back as late Greek civilization, but that as the West begins to enter its post-literate phase, the ear will return as a primary sensing instrument, just as it still is in many parts of the world.

The fact that the Western World has a noise pollution problem today and that increasing numbers of people are aware of it is one clear sign that we have reached this change-point.

Photo Kyoshi Hasaka, © Parimage, Paris

Technological civilization has brought sweeping changes to our acoustic environment—the "soundscape". Today the "harmonies of nature" are seldom heard except in places far from the hubbub of modern life: leaves rustle and water laps beneath the paddle (opposite page) as a boat glides over the tranquil waters of a canal in Kerala (India). But in most cases "background noise" now tends to be an all-pervasive cacophonous din. The roar of jet engines inflicts intense strain on the nerves and eardrums of people living near large airports (photo left).

The ears are crying out for greater respect. We can recognize what they are telling us or we can give up and resign ourselves to inevitable deafness as the hurricane of noise increases.

Soundscape is the term we use to describe the acoustic environment. You will not find it in any dictionary. We have derived it from landscape but its properties are different. Consider the number of people who have helped to define the meaning of landscape for us: geologists have studied its structures, geographers its surface formations, painters and poets have described it, gardeners and engineers have shaped it, architects and planners have embellished it. As for the soundscape, who has studied that? It is a discipline we must now learn, or rather relearn.

It is to this end that, a few years ago, we set up the World Soundscape Project. Perhaps the best I can do in this short article is to describe some of the approaches of our work and hope that they will suggest fresh or related studies elsewhere in the world.

To effectively know about the soundscape we must consider the past as well as the present in order to make intelligent recommendations for the future. How can we do this? We can tape record and analyse soundscapes of the present and we can talk to people who inhabit them to find out what they think. Still we can't delve into history with our microphones and our analytical equipment.

Here history becomes geography. We can, for instance, study wilderness environments in northern Canada or the deserts of Australia. Or we can get some impression of the past acoustic environments of a complicated continent such as Europe by selecting and comparing remote villages in different countries.

The first thing we notice when we study a wilderness soundscape or even a rural or village soundscape is that it is quieter than that of the modern city. Yet this is not because of the absence of life there. Rather it seems that whatever sounds that are present are subject to cycles of activity and rest. The sound producers seem to know when to speak up and when to shut up.

Different species of insects, animals and birds complement each other in daily and seasonal rhythms of synchronized beauty. For instance, during the months of June in British Columbia, frogs will leave off chirping at precisely the moment when birds begin their dawn chorus and will only return as the last bird is fading at sunset. Geese will be heard only a few days each year in Ontario as they streak north in May and return in huge honking flocks on their way south in October.

Such environments, uncluttered by an overpopulation of competing sounds we call hi-fi. That is to say, the signal-to-noise ratio is favourable. Every sound is newsworthy. Each is made for a purpose and is complementary to the others, like a good conversation or a good orchestration in music.

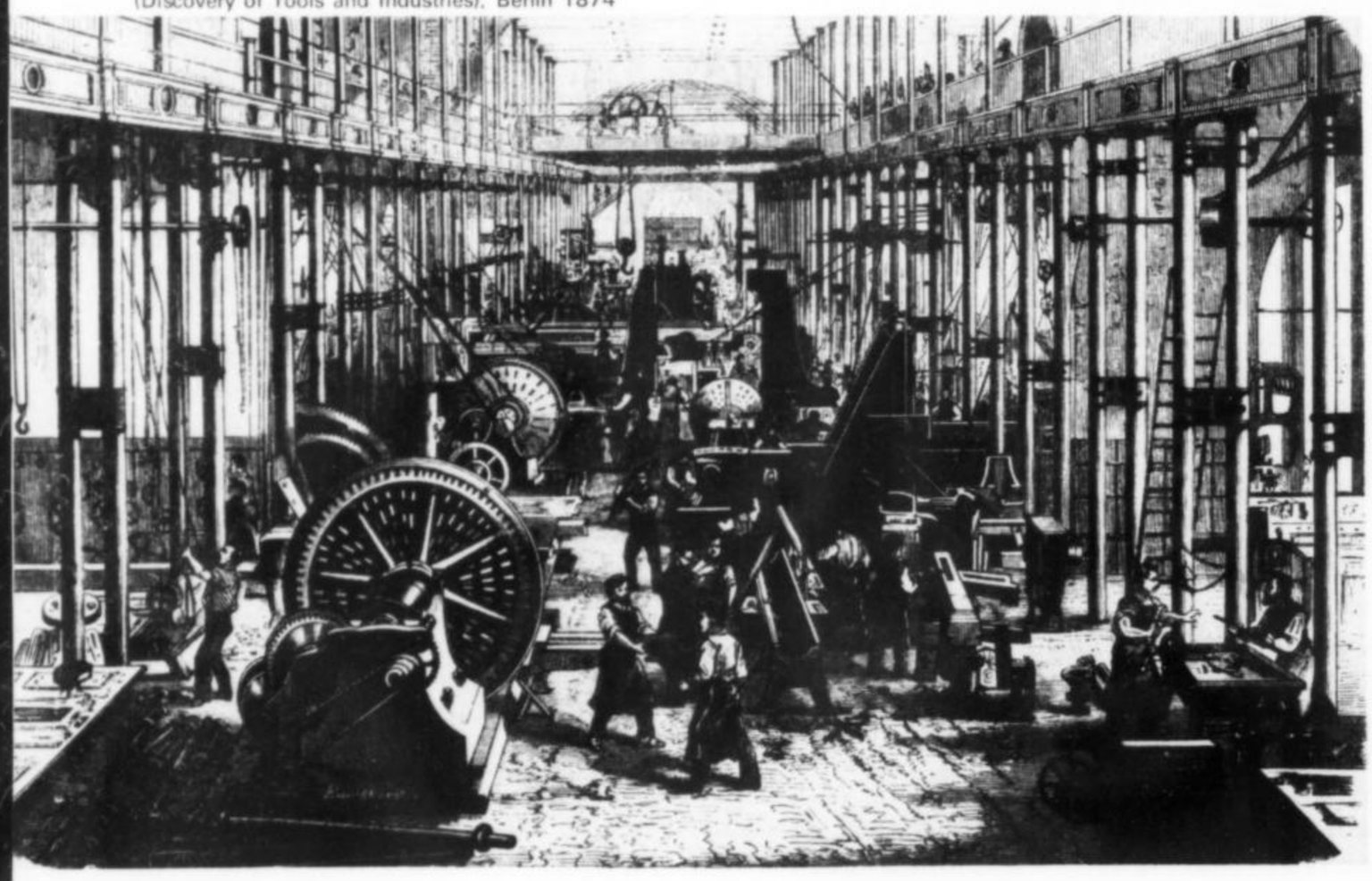
One learns to read such signs for vital clues about the environment. For instance, on my farm we know ▶

Photo C. Kosidowski, Moscow

HORSE-POWER WITHOUT THE HORSE

In a square of Ulan Bator, capital of Mongolia (above) a horse left fettered by its rider gives vent to its indignation with an outburst of bucking and neighing. Such a scene is uncommon in cities today, where the neighing of horses and clop-clop of their hooves have been replaced by the din of motor traffic: horse-power without the horse. From the start of the Industrial Revolution in the 19th century workers in the metal industries had to put up with a bedlam of noise (see engraving below) and in spite of preventive measures taken in recent decades, deafness from excessive noise can still be an occupational hazard.

Engraving from *Das Buch der Erfindungen, Gewerbe und Industrien* (Discovery of Tools and Industries), Berlin 1874



the ground has thawed in spring and is ready for ploughing when, lying in bed at night, we can hear animals burrowing beneath the surface.

The same is true of village life. When we studied the mountain village of Cembra in Northern Italy we found that life centred on annual and seasonal cycles of festivals and special events, each with its prominent acoustic soundmark.

Church bells were rung in different ways on different occasions, small cannons or *mortaretti* were fired on fixed days; there were certain days when the goatherd's horn conducted the sheep to summer pasture; there were special days for folk songs and special horns that were blown when youths and girls were courting.

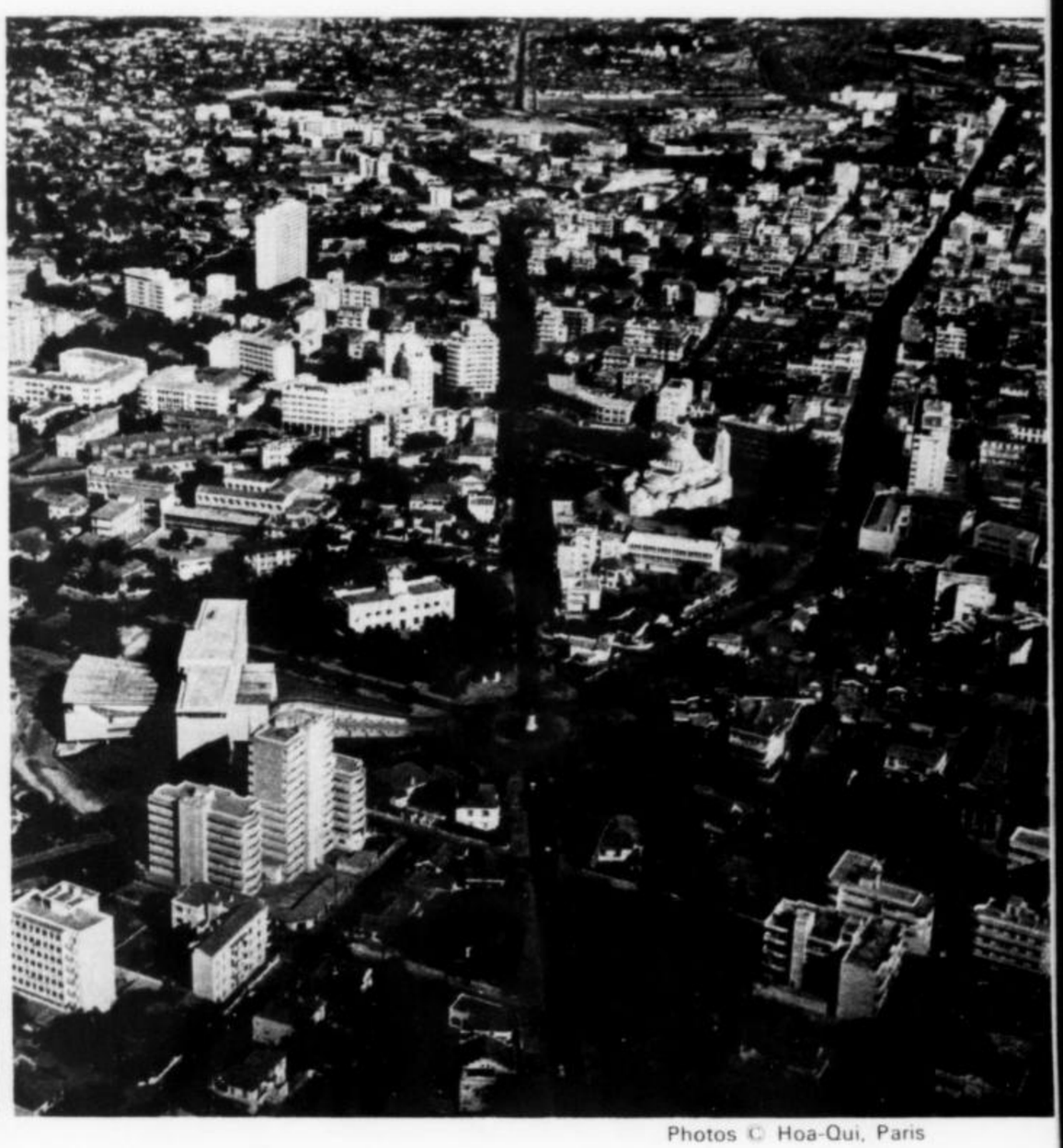
The whole village was enfolded in periodic sound cycles that only began to disintegrate when a new road brought mountain buses up to connect the village with the cities in the valley below.

The transition from rural to urban life can be characterized generally as a passage from the hi-fi to the lo-fi soundscape. A lo-fi soundscape is one in which trivial or conflicting acoustic information masks the sounds we want or need to hear. For a sound to catch one's attention at all it must be monstrously loud or insistent. Radios, the birdsong of modern life, do not go south in winter; bulldozers do not hibernate and traffic does not sleep at night. Everything operates simultaneously with much wasted acoustic energy and attendant destruction of nerves and eardrums.

The study of the natural soundscape suggests not only that the total volume of sound needs to be reduced in order that diminutive or message-bearing sounds can again be clearly heard, but it also gives us the clue as to how this might be achieved by the restoration of clearer rhythmic patterning.

Curfews on jet flights at night is one possibility, but this needs to be augmented in other ways, for instance by restrictions on construction equipment or loudspeakers in public places. Where they are a nuisance, a neighbourhood might even consider restricting the operation of power lawnmowers to one or two evenings a week.

Another difference between the urban and rural environment is that in the urban environment most sounds are close by while in the natural environment many are distant. The urban soundscape possesses presence while the natural soundscape possesses both presence and an



Photos © Hoa-Qui, Paris

CITY TUMULT AND FOREST MURMURS

Like natural and man-made shapes such as the palm tree and the city of Dakar, in Senegal (above), sounds have their own architecture, also modulated spontaneously by nature or drawn from the myriad noises of human origin. Today research teams are analysing and measuring the volume of the innumerable noises forming the "soundscape" in many parts of the world, under a project directed by the Canadian composer R. Murray Schafer. Diagram below pictures the cycle of the sounds of nature on Canada's Pacific coast.

CYCLES OF THE NATURAL SOUNDSCAPE OF THE WEST COAST OF BRITISH COLUMBIA BY RELATIVE VOLUME OF SOUNDS

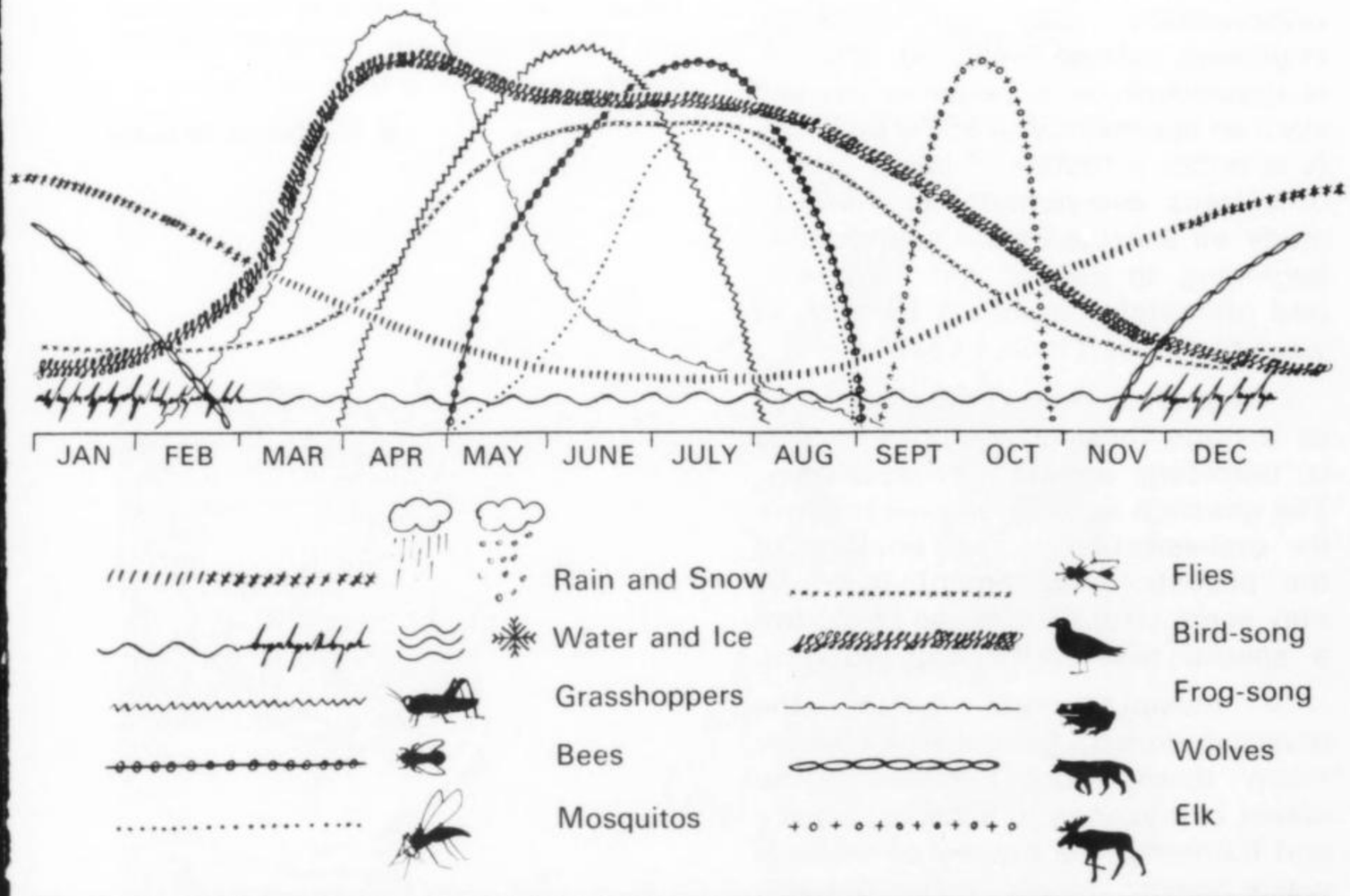


Diagram © R. Murray Schafer, Vancouver

acoustic horizon. Then news of invasion into the area is picked up by the ear. A dog on a distant farm signals the arrival of a strange animal or a visitor to the neighbourhood.

Dependence on the ear was especially strong in the early days in North America as Fenimore Cooper's novels show. Danger was then signalled by the snapping of a twig. In a deep forest vision is useless; one sees at best a few metres in any direction. The ear is alert like that of an animal. Curiously, the same dependence on the ear is evident in the treeless deserts of Australia today, where an aborigine can, by pressing his ear to the ground, pick up footsteps as distant vibrations. A car, for instance, can be heard 20 kilometres away, first as a ground vibration.

Sometimes hearing at a distance is vital to the survival of a community. In the Breton fishing village of Lesconil we conducted a study which illustrates this clearly. A daily on-shore-offshore wind cycle carries a complete circumference of distant sounds to the village, some as far away as 12 kilometres. Bells from distant villages are heard, sounds from inland fields, buoys in different locations at sea, each appears at its appointed time. Any change in the accustomed pattern indicates a change in the weather, a matter which each fisherman and fisherman's wife picks up immediately with practiced ear.

Acoustic space is not visual or physical space. It cannot be owned or delimited on a map. It is shared space, a mutual possession from which all inhabitants receive vital signals. It can easily be destroyed by thoughtless soundmaking or imperialistic noises.

The modern world shows us many examples of mismanaged acoustic space. For instance, without expanding its physical premises an airport may require more and more acoustic space to accommodate increased flights or newer and noisier aircraft. A citizen may then discover that he is sharing his bedroom or his garden with the international aviation industry and yet he will get little relief in modern law, which defines property exclusively as a visual holding.

As we move into an acoustic era such attitudes will change and eventually they must be expressed in new legal conceptions also. Sound imperialism will then be considered as much an offence as breaking and entering.

Another way to learn about the changing soundscape is through earwitness accounts of people who have described the sounds of their own time and place; and so we have been compiling a large catalogue of such descriptions from writers of all periods and nationalities with the hope that it will enable us to discover more about soundscape morphology and also will tell us something about the changing attitudes of listeners over the centuries.

We have cross-indexed this catalogue by time, place and the sound objects described, and an accompanying computer programme enables us to make statistical comparisons concerning the appearance and disappearance of the different sounds in our index. It will be a long time before we have enough references to make reliable deductions for all parts of the world, but we do have a large sampling of sounds from European and American sources and we can draw some interesting conclusions from them.

For instance, we note that of all sound quotes from 19th century European literature 43 % referred to natural sounds, while during the 20th century mentions of natural sounds had slipped to 20 %. Interestingly enough this decline is not observed in North America, where just over 50 % of all quotes for both centuries refer to natural sounds. One might assume that North Americans are still closer to the natural environment, or at least that they have easier access to it than Europeans, for whom it definitely seems to be disappearing.

We notice a decline also in the number of times quiet and silence are evoked in earwitness descriptions. Of all descriptions in our file for the decades 1810-1830, 19 % mention quiet or silence; by 1870-1890 mentions had dropped to 14 % and by 1940-1960 to 9 %.

In going through the catalogue I am struck by the negative way in which silence is described by modern writers. Here are some of the modifiers employed by the most recent generation: solemn, oppressive, deathlike, numb, weird, awful, gloomy, brooding, eternal, painful, lonely, heavy, despairing, stark, suspenseful, aching, alarming...

The quiet and silence evoked by these worlds is rarely positive. It is not the quiet of a contemplative walk in the countryside, it is not the quiet one observes when listening to music, it is not the silence of fascination or meditation, or even the silence of sleep.

Does this mean that such qualities are going to disappear from our planet forever, or does it mean rather that our attitude towards them needs to be revalued?

The loudest and most continuous sounds in the world today are those of modern technology. It is these sounds which are destroying our hearing, disrupting the natural rhythms of our lives and pulverising the word tranquility in every language. If we are to recover elegance and balance in the soundscape, it is machinery that will have to be brought under control first.

This is not a matter of passing the responsibility over to acoustical engineers, whose livelihood, after all, is dependent on a perpetuation and even an augmentation of the problem. It is rather a matter of larger groups of citizens everywhere beginning to study all aspects of the soundscape, beginning to assess and criticize it, and ultimately beginning to think of ways to render it more beautiful.

I have often likened the soundscape to a huge musical composition that is unfolding around us ceaselessly. The question is: how can we improve its orchestration? The analogy of the acoustic environment to music may seem strange to some but I have a special reason for suggesting it.

In music sounds matter; the musician doesn't fumble with them or throw them about aimlessly. The object of music is to achieve balance and harmony; the enemy of music is waste energy, noise. It is important, I feel, to keep the model of music in mind as we begin to design the world soundscape, for it reminds us that our task will be one of uniting science and art in the service of society.

Redesign the acoustic environments of the world? What an arrogant and preposterous idea this will seem to some. All I can say is that it is already being done, though often thoughtlessly or by people whose motives are unaesthetic and antisocial.

Purveyors of background music are creating sound walls which nobody asked for in the interests of inducing workers to produce more or consumers to spend more. Generators for producing white noise (a background sound that is a blend of audible frequencies over a wide range) are now being installed in modern office buildings in North America in order to prevent office workers from talking so that they can type more letters for their bureaucratic bosses.

In Sweden the ringing of telephones, nicely paced at ten-second intervals, was sharply sped up to five-second intervals in 1975 in order to force people to answer their receivers more promptly. For a telephone company the less time a line is tied up, the more money that can be saved. Thus, for the saving of a few crowns a whole nation is going to be made more jumpy.

Examples of bad acoustic design could be multiplied endlessly. We can only improve them when we begin to consider other motives than profit and power in the shaping of sonic artifacts, when we learn how to control loud or irritating sounds, when we learn how to reclaim quiet groves and times in our lives, when we learn that there is a time to make every sound and a time not to.

■ **R. Murray Schafer**

ROCK...POP... AND RISING DECIBELS

by Irmgard Bontinck and Desmond Mark

Photo © J. Vanfleteren, Belgium.

Young lovers of yesteryear (see medieval engraving below) could meet in gardens orchestrated by birdsong and water fountains. Today's Romeo and Juliet (above) must try to whisper sweet nothings against the babel of the modern city.

15th-century German engraving
© Metropolitan Museum of Art, New York, 1974.

TRY to imagine yourselves in the quiet countryside somewhere, making your way towards a town. In order to get a better idea of the changes in your acoustic environment, you close your eyes, and put your ears to work more sensitively. If we regularly put our aural impressions down on paper at specific points in this sound-walk, then we shall have produced a kind of acoustic map which would ultimately allow us to recognize by its typical features many individual parts of the globe.

Naturally enough, it is a much more difficult business to prepare a map of a soundscape than a geographical map, even more so since the methods and terminology are only in the first stages of development. Sonography and geography are still a very long way apart. The Canadian composer and music educator R. Murray Schafer has become particularly fascinated by this problem, and in the "World Soundscape Project" which he conceived, he is setting out to research the multifaceted links which exist between Man, the sound environment, and music itself. (See article page 4)

How would the map of our soundscape look? In the rural, unurbanized world of sound, noises present themselves mainly one at a time, springing out of a deep surrounding silence. Even the smallest sounds can be

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SOUND AND SUPERSOUND

Fascinated American audience listening through ear tubes to phonograph playing popular tunes in the 1880s (below) is a far cry from mass events such as the Woodstock rock music festival in 1969 (far right) attended by 300,000 young spectators in Bethel, New York. The breakthrough in electro-acoustical devices has made mastery of the technology as important as mastery of the musical instrument (right). Fears that mechanization of music might induce a passive musical attitude in young people are not borne out by a recent study on urbanization, modernity and musical behaviour of Indian youth by Dr. Manas Raychaudhuri, of Rabindra Bharati University, Calcutta. "The transistor radio", he reports, "has stimulated an active interest in traditional and non-traditional music among young people in rural and semi-urban areas of India."

Photo © Bettmann Archive, New York.

Photo © Tibor Pasztory, Paris.

picked up, and tell their own clear story to the countryman. From the low tinkle of cow-bells, he can tell where his cattle are, for example. Birdsong, the rush of a brook, human voices—all these aural events can be told apart, clear one from another, and free of distortions and background noise.

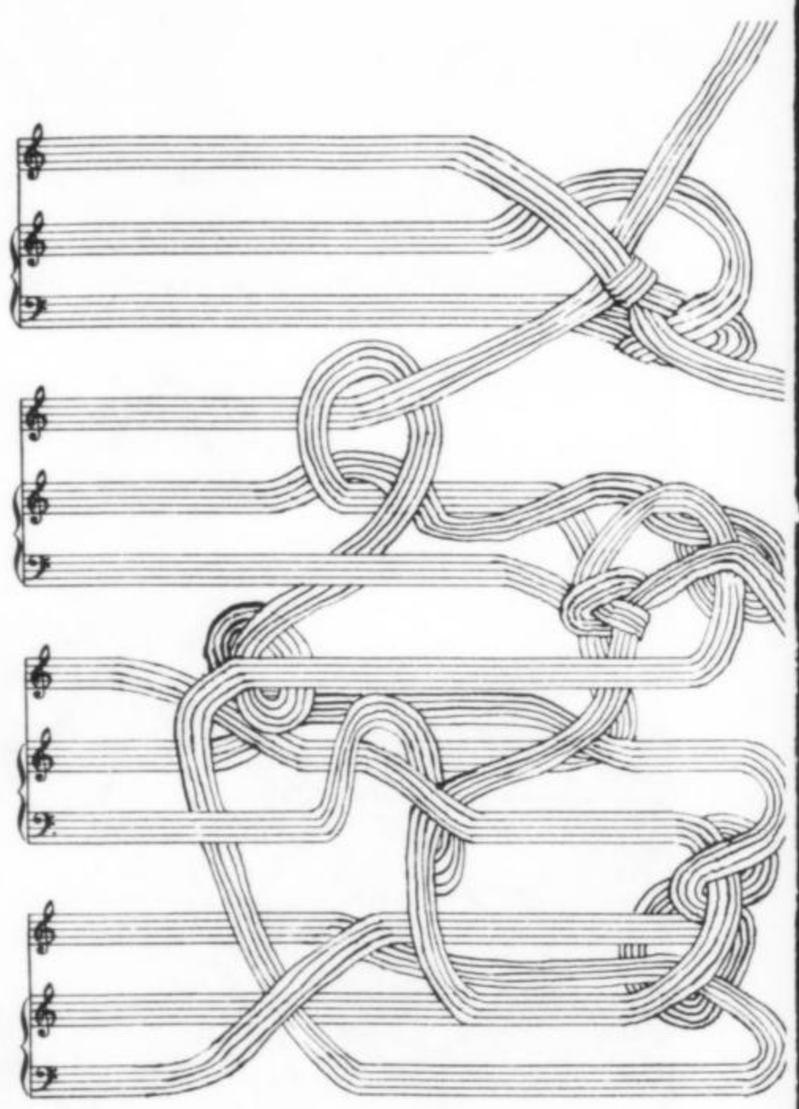
The nearer we come to the town, the heavier becomes the noise of cars, trains, aeroplanes, construction machinery, and so on, overlaying the natural world of sound until it is completely drowned out by the noise of machines and traffic.

In this industrial sound-world single acoustical signals are buried in a broad and deep bed of background noise; in order to make an individual signal capable of being picked out, it must be enormously amplified—and that also includes human forms of communication, such as speech and music.

If we examine the development of this industrial sound-world in historical terms, we arrive at much the same conclusion as we did following our earlier sound-walk. For many thousands of years our ancestors lived as hunters and foragers in the context of an acoustic landscape overwhelmingly composed of the sounds of the natural environment, with human sounds reduced to a very minor element, and the noise of tools and man-made instruments very rarely falling on the ear.

It was only in the industrial epoch, which began in Europe during the first half of the 19th century, that the soundscape underwent a radical alteration. Today we live in industrial centres producing a tidal wave of noise unthinkable in earlier times, and whose power steadily exceeds the power of the human organism to withstand it.

The human ear is a highly sensitive instrument, able to measure sound intensities ranging from the smallest perceptible physical intensity to an intensity a million times greater. The measurement of the strength of sounds, however, is calculated according to the logarithmic decibels scale. Each addition of 10 decibels (dB) in intensity denotes about a doubling of subjectively received sound. Between the auditory threshold and the roar of a jet engine, which can cause actual physical pain, lies a range of some 120-130 decibels.



Jazz as seen by an American artist, Bob Gill (1963).

Photo Neal Zachary-UNICEF

From "Musique d'Aujourd'hui" by Romain Goldron
© Les Editions Rencontre and La Guilde du Disque, Lausanne, 1966.

The increasing noise of the environment must obviously have an effect on men and their music. In the industrialized world people have become quite used to the fact that as one's age increases, the inevitable consequence is a growing loss of hearing. But studies carried out in the area inhabited by the Mabaan tribe in Sudan have turned up the surprising fact that the tribe, living in a peaceful acoustic environment, has almost no experience of hearing-loss connected with increasing age.

A comparative study carried out with the inhabitants of a Western industrial country showed that the hearing capacity of an 80-year-old Central African was still as great as that of an 18-year-old New Yorker. The obvious conclusion is that any natural hearing-loss in the aged is radically modified by environmental factors.

Even more dramatic is the effect of the new sound-world on the countries of the developing world, where the transition to the age of technology and its accompanying acoustic inferno is not reached in a steady, step-by-step, upward climb, but in one abrupt burst.

The effects of this tidal wave of noise can also be severely increased by the climatic conditions; in areas where the ambient heat makes it necessary, and part of the local custom, to keep doors and windows open for most of the year—such as the cities of India, which have provided the basis for a report on the problem—the level of noise inside the dwelling can be as great as the level outside.

In the industrialized world, at least it is not only the noise of machinery which is omnipresent; music can also be made available on a mass scale, thanks to the existence of loudspeakers. One can hardly imagine a situation in which loudspeaker music is not readily available: in supermarkets, aeroplanes, restaurants, cinemas, banks and in the home—we can hear music everywhere.

This again is quite unknown to previous generations in human history. While before, music and speech were inextricably linked to the physical source of the sound, whether instrument or speaker, today any desirable sounds can be separated from their source by electro-acoustical means, and reproduced on records or tapes, to be put out with the aid of loudspeakers at any time and in any place.

The significance of electro-acoustical techniques, in fact, goes much further than a simple reproduction and instant availability of music; it also allows a range of ways in which original live music can be altered in terms of intensity, sound-tone, acoustic characteristics and so on.

It is in no way surprising that the attitude to music shown by young people—particularly open to change and innovation—has been deeply affected by the new sound-world around them, or that they have become very accustomed to the idea of music linked with technology.

With the breakthrough in electro-acoustical devices (loudspeakers, amplifiers, mixers, and so on), the music of young people is a completely new approach. The use of technological machinery has now been integrated into the making of music, and the mastery of the technology is now as important as the mastery of the musical instrument for performers. Never before in the entire history of music has the average musical performance been so dependent on technical means as it is now.

The most striking technical manipulation of music for young people lies in the area of musical dynamics: amplification. The level of amplification to be experienced in pop or beat concerts, in discothèque or beat cellars is one of the most characteristic signs of the changed acoustic-musical environment. Some exact measurements have been taken in a number of countries of this particular relationship of youth to music, one in particular from Switzerland.

During a pop concert in Lausanne a technician checked the amplification in various parts of the concert hall, and later described the possible consequences of the level of sound received by the audience: "Measurements with the sonometer taken during the Mahavishnu Orchestra concert showed sound levels of 125 dB at a distance of three metres from the loudspeakers, 110 dB in the back stalls, and 118 dB in the front row of the balcony. It is perfectly possible that 100-200 people—that is, some 10 per cent of the total audience—would have sustained irreversible damage to their eardrums; in other words, nerve-endings would have been destroyed that cannot be regenerated."

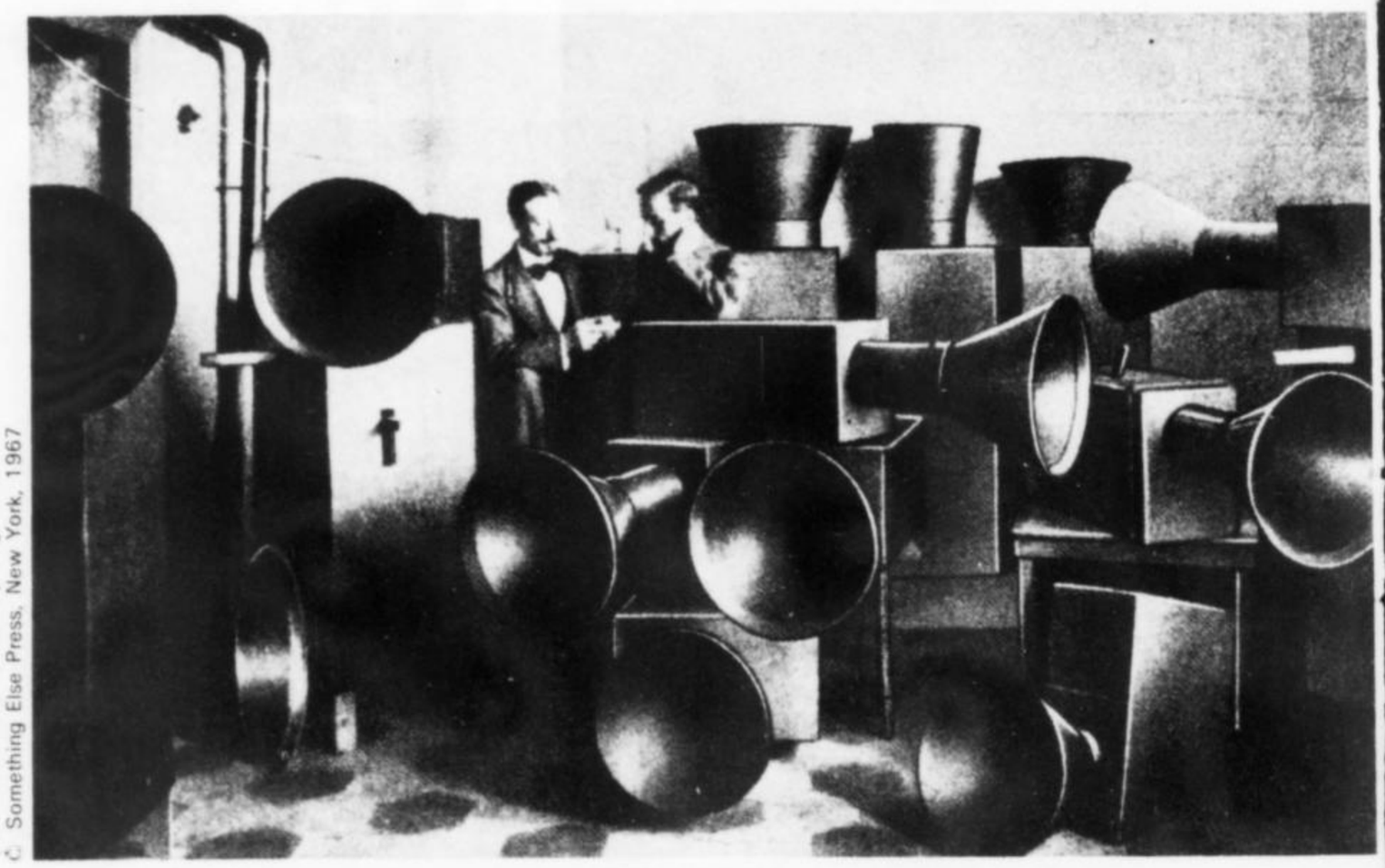
For all that, there is no point in wringing one's hands over the entry of electro-acoustic devices into the development of music and the experience of young people, or indeed—as is often the case—shutting one's ears to any discussion of such "deplorable" phenomena. To identify youth with noise is hardly helpful to an understanding of the many-sided problems of where man and music stand in the acoustical environment of today; this is an area in which it seems particularly easy to confuse cause and effect.

One must look deeper into this specific acoustical relationship, in the context of the general environment, in order to arrive at an understanding and so make it more possible for alternative measures to be taken successfully. Musicians, teachers, technicians and sociologists have all arrived at explanations for the strikingly high sound-levels of music for young people—each of them in some way linked with the modern human environment.

The first argument is that the phenomenon stems from an intentional break with the adult world. Young people demand their own areas of freedom, and achieve them—in this sense—through the erection of a "sound barrier". This acoustic wall protects their area of autonomy from those grown-ups who refuse to cross this sound threshold. Within the barrier, youth can operate freely and undisturbed.

The second thesis treats this erection of a wall of sound in terms of the sound-level of the environment. In order to make themselves audible, and to allow their own musicians a proper hearing, it is necessary to be louder than the ambient sound-level.

Some thought-provoking material has been produced on the links between the general environmental level of sound and the sound-levels of



From "The Art of Noise" by Luigi Russolo
© Something Else Press, New York, 1967

ORCHESTRA OF BUZZERS AND HOWLERS

As early as 1913 the Italian futurist painter Luigi Russolo (1885-1947) had the revolutionary idea of using the everyday noises of the industrial age to create a truly modern form of music. Above, Russolo with some of the "buzzers and howlers" he invented to represent the sounds of industry, technology and urban life. Russolo compositions, bearing such titles as "Awakening of a Capital" and "Meeting of Automobiles and Airplanes", were produced on these devices and presented to Italian audiences in 1914. In the early 1920s "noise instruments" imitating sounds from industry were also constructed in the U. S. S. R. and used to perform "noise symphonies" and "operas". About the same time experimental symphonies of factory whistles were held in several Soviet cities, partly due to the efforts of the great Russian poet Mayakovsky.

30,000 SINGERS ON STAGE

**Below, mammoth annual song festival at Tallinn (Soviet Estonia).
During the two-day event open-air concerts attended by over 200,000 spectators are held in the "Field of Song", whose immense shell-shaped stage has room for 30,000 singers and 20,000 dancers.**

Photo © APN, Moscow.

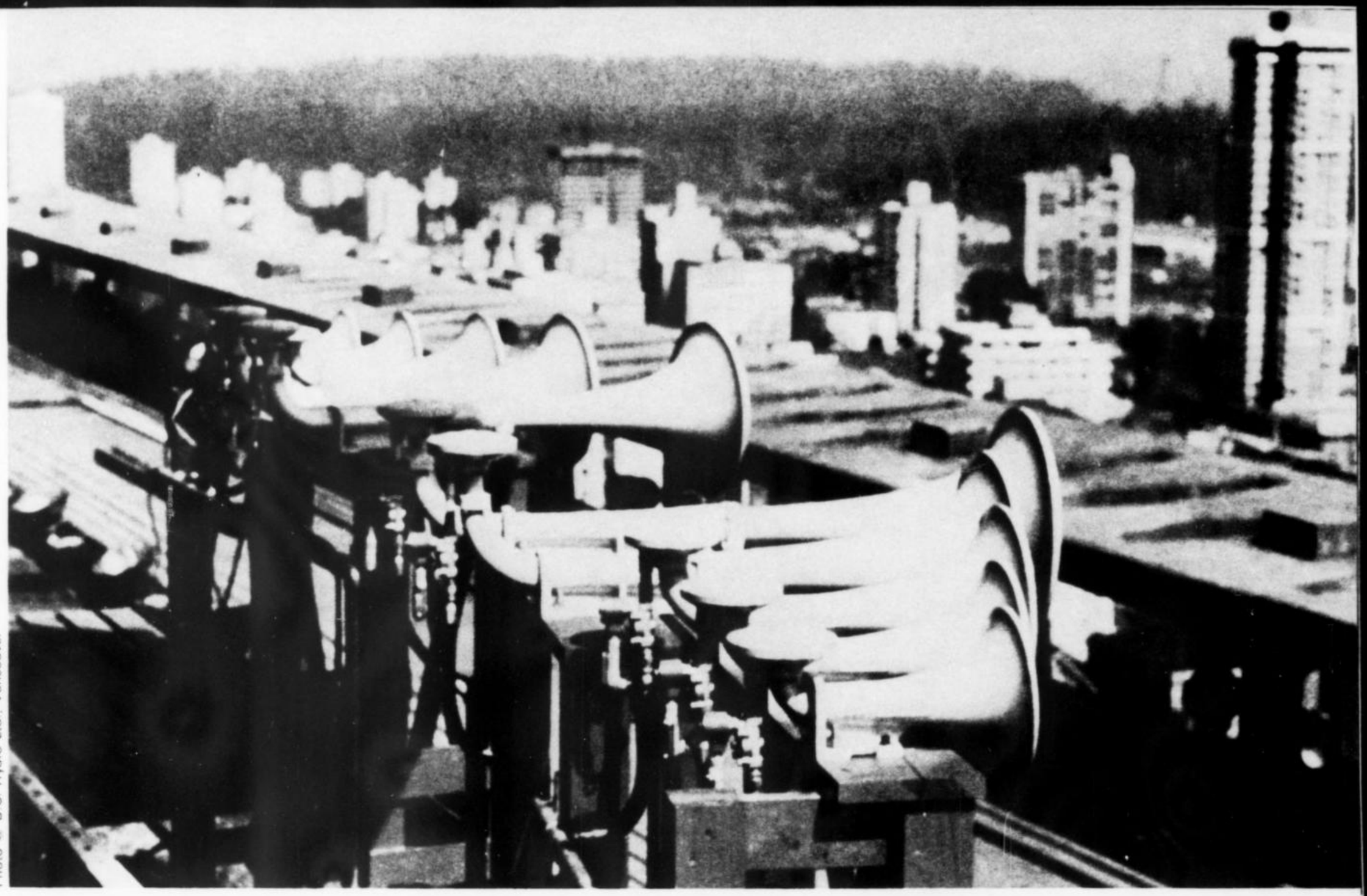


Photo © B.C. Hydro Ltd., Vancouver

SOUNDMARK OF VANCOUVER

One of the prominent soundmarks of Vancouver (Canada) is this set of air horns on top of one of the city's higher buildings. It plays the opening of Canada's national anthem each day at noon. It has been doing so since 1967 when a local engineer, Robert Swanson, thought up the idea as a way of celebrating Canada's Centennial that year. Two other Vancouver soundmarks are the bells of Holy Rosary Cathedral and the nightly boom of the Nine O'Clock Gun.

music, not only in the realm of beat and rock concerts, but also where contemporary "serious" music is concerned: in a historical perspective, the growth in the size of orchestras between Haydn and Mahler is also not without interest.

The next argument is closely connected with the preceding two, but is based not on an attempt to overpower and drown out ambient sound-levels, but to imitate them.

Here a number of acoustic factors play a part, all of which can be found in current music. The level of sound is the most apparent characteristic, but there are also special reverberative notes, continuous droning, or clearly recognized rhythmical patterns which match entirely the modern sound environment.

If one now compares the unchanging broad spectrum of background sound to the low drumming of a beat band, the sharp wailing of a synthesizer, and the clumped notes (cluster effect) of modern music, the argument that the music is a mirroring of our technical modern world of sound becomes at least plausible.

Yet another thesis looks at the effect of over-loud music on the human organism. Thanks to a number of scientific experiments in the area of music therapy we now know that music has a very powerful effect on the autonomous nervous system in man, particularly where the action of the heart, the blood circulation, and breathing rhythms are concerned.

These physiological reactions allow one to argue that beat music, for example, is not merely experienced through the auditory system, but is felt on the pulses, on the skin, in breathing and in the heart itself; the whole physical body is affected by music.

When listening to musical performances amplified to abnormal levels, more hormones are released and a state of excitement is induced in the listener. The over-amplified sound has the effect on the organism of an alarm signal, forcing the release of more adrenalin—the "fight or flight" hormone—from the body's chemical system.

This physical stress situation can be stimulating; it can also lead to acts of aggression, e.g., the destruction of seats at the end of a concert. The flight reaction of the body moves completely beyond conscious control, and can lead, in the extreme, to fainting fits.

Even more important are the most recent studies on the effect of over-amplified sound on the body. These studies see the consequences reaching much further than their initial effect on the nervous system, and actually affecting the substance of the brain.

As a result of acoustic shock, the engrams—the delicate pathways traced in the brain which produce memories—can be erased. Memory gaps can be induced. This finding is even more alarming when considering the position of people forced to live in an industrial soundscape.

Thus, today, we find ourselves in a situation of acoustical crisis. We will have to re-think the entire relationship of men to their acoustical environment, as well as the increase in noise-producing potential in our technical tools. The conscious control of our acoustical and musical environment seems yet more necessary when we remember that the same technology which has expanded the sound range and repertory of contemporary music to such a fascinating extent is also threatening our very capacity to hear, to remain sensitive to sound.

The time has come for a campaign for the acoustical quality of life, for an ecology of sound.

■ Irmgard Bontinck and Desmond Mark

Photo © Rémy, Paris.

TUNING IN TO THE PAST

Can we recapture soundscapes of bygone days?

Photo © H. Roger Viollet, Paris.

The Western world of the Middle Ages readily believed that the peoples of distant and little-known lands possessed strange characteristics, including oversized physical features. One example was the "Panotii", people with enormous ears who were thought to live "somewhere in the Indies beyond the Ganges". In the 12th century, images of three "Panotii" —a man, woman and child—were carved above the portal of the church of Vézelay, in France (photo right). For Christians of medieval times the ear symbolized in particular the hearing of the divine word. Left, a massive bell about to be tolled in one of the many temples in the town of Bhadgaon (Nepal).

by David Lowenthal

WHAT becomes of music, speech, and other sounds, natural and man-made, when they cease reverberating? How far do previous sounds differ from those of today? How much do we remember of what we hear? What meanings and emotions attach to sounds from the past? Why do familiar sounds often trigger nostalgic yearning? What sounds do we regard as antiquated, and why?

On these topics little is known and less has been written. For each of us the answers depend, in part, on our age, our cultural heritage, and our musical and other auditory experiences. This article is a first exploration into past sounds and our feelings about them.

The world we live in is a product of the past; the very familiarity of its features implies the memory of previous experience. Awareness of the past through mementoes and monuments is essential to individuals and to nations; the recognition of continuity gives meaning to the present and hope to the future. Vision is the main sensory mode through which we apprehend the past, but it is not the only one. We are aware of the passage of time and the endurance of things through other senses too.

This assertion may seem hardest to demonstrate with respect to sound. No noise that human beings are capable of hearing is really old. Radio signals from the stars, to be sure, have taken many light years to reach the earth, but these play an inconspicuous role in our acoustical landscape. No sound that we actually hear is more than a few moments old; the rapid decay of sound energy coupled with our limited capacity for hearing makes even the loudest noise undetectable soon after its inception.

In one sense, however, sound seems the essence of time. Aural impulses have long been the main way of marking off years, seasons, weeks, days, hours, and minutes: bells, chimes, and other clock mechanisms provide a man-made counterpoint to the natural periodicity of pulse and heartbeat, and enhance our awareness of connexions between past and present.

Yet to recover the sounds of the past is an infinitely more difficult enterprise than to restore the visual images of previous landscapes. Countless visible relics, however eroded, decayed, or selectively preserved they may be, nonetheless survive to tell us much about the bygone material world and its spatial organization.

But of sounds from the past, save for a small and relatively recent repertory, recorded for the most part under laboratory or studio conditions, not a trace remains. No recording ▸

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exists of the loudest known noise in world history, the explosion of Krakatoa volcano on 26-28 August 1883, which was heard 3,000 miles away, and it is probable that no one now alive would remember hearing it.

Of sounds before the phonograph, we know only what can be surmised from indirect evidence: the noises of presumably unchanging natural or human activities; the sounds produced by ancient musical instruments; the performance of music preserved in notational form; the written accounts of those who heard and reacted to the noises and music of their times.

"We know how Chopin played," as Gerald Abraham puts it in *The Tradition of Western Music,* "only through the playing of the pupils of the pupils of his pupils." And their memory, like all of ours, is a notoriously fallible guide. Earwitnesses are to be trusted even less than eyewitnesses. "Long term memory tends to 'idealize' and isolate sounds," notes Barry Truax in an aural history interview, which is one reason why the tape-recorded past seems quite unlike the sounds we imagine we remember.

But however deficient these indirect modes of historical reconstruction may be, they are often invaluable. The timbre, tone, and rhythm of a clap of thunder, the beating of surf against the shore, have probably varied little over many millennia; the ancient flute sounds today much as it did when first made; the clash of spear against shield, the ring of the hammer at the forge, the sizzle of meat on a Neolithic spit can be fairly accurately reproduced by reactivating their constituent parts.

Other features of past soundscapes, however, are now unrecoverable: the utterances of extinct species, the clangour of early metallurgy, the intonations of ancient languages, the distinctive susurrus of obsolete domestic crafts. Not least, the words spoken on any particular occasion throughout history are gone beyond recall.

For most of this we lack even indirect evidence. Least accessible is the total ensemble of sounds that characterized past epochs, the interplay of background and foreground noises that made up the daily soundscape heard in each community and locale.

We do have some clues to these things, for we know that the sounds of nature antedate those of man, and that machine noise follows the man-made sounds of pre-industrial times.

Photo © from *Aberrations,* by Jurgis Baltrusaitis, Olivier Perrin publishers, Paris 1957.

Nostalgia for past sounds indeed centres on our efforts to recapture, or re-experience, the soundscape patterns that we associate with earlier, simpler, more natural epochs.

Particularly do we sometimes long for silence, that interval between sounds so seldom present in the interstices of our electronic age. Nostalgia sometimes deceives us about the past; not even screeching jets and thundering subway trains could be much worse than the wheeled traffic of late 19th century London, as recalled in 1958 by the architect H. B. Creswell:

The noise... was a thing beyond all imaginings.... The hammering of a multitude of iron-shod hairy heels upon [the granite 'sets' of the streets], the deafening, side-drum tattoo of

DESIGNED WITH EAR AND EYE

In religious buildings, certain architectural forms tend to promote the kind of audio-visual balance required for religious worship. Such buildings have a vitally important acoustic function: singing, prayers and instrumental music establish a link with the spiritual world. In Gothic cathedrals the lightness of the arches and the rhythmic repetition of the lofty stained-glass windows help sound waves to disperse. Like the vaulting branches of trees in a forest, the arching pillars act as distributors of sound, an analogy strikingly illustrated in photo montage, left, of a Gothic nave giving on to a forest path. Below, entrance to the Shah Abbas, or Blue Mosque, at Isfahan (Iran) where the acoustics are so sensitive that a snap of the fingers directly beneath the cupola echoes no less than seven times. Bottom, 13th-century minaret in Turkmenistan (U.S.S.R.): from its tip the voice of the muezzin echoes as far as the horizon. Minaret's spiralled structure recalls that of the famous ziggurat-shaped minaret of Samarra (Iraq).

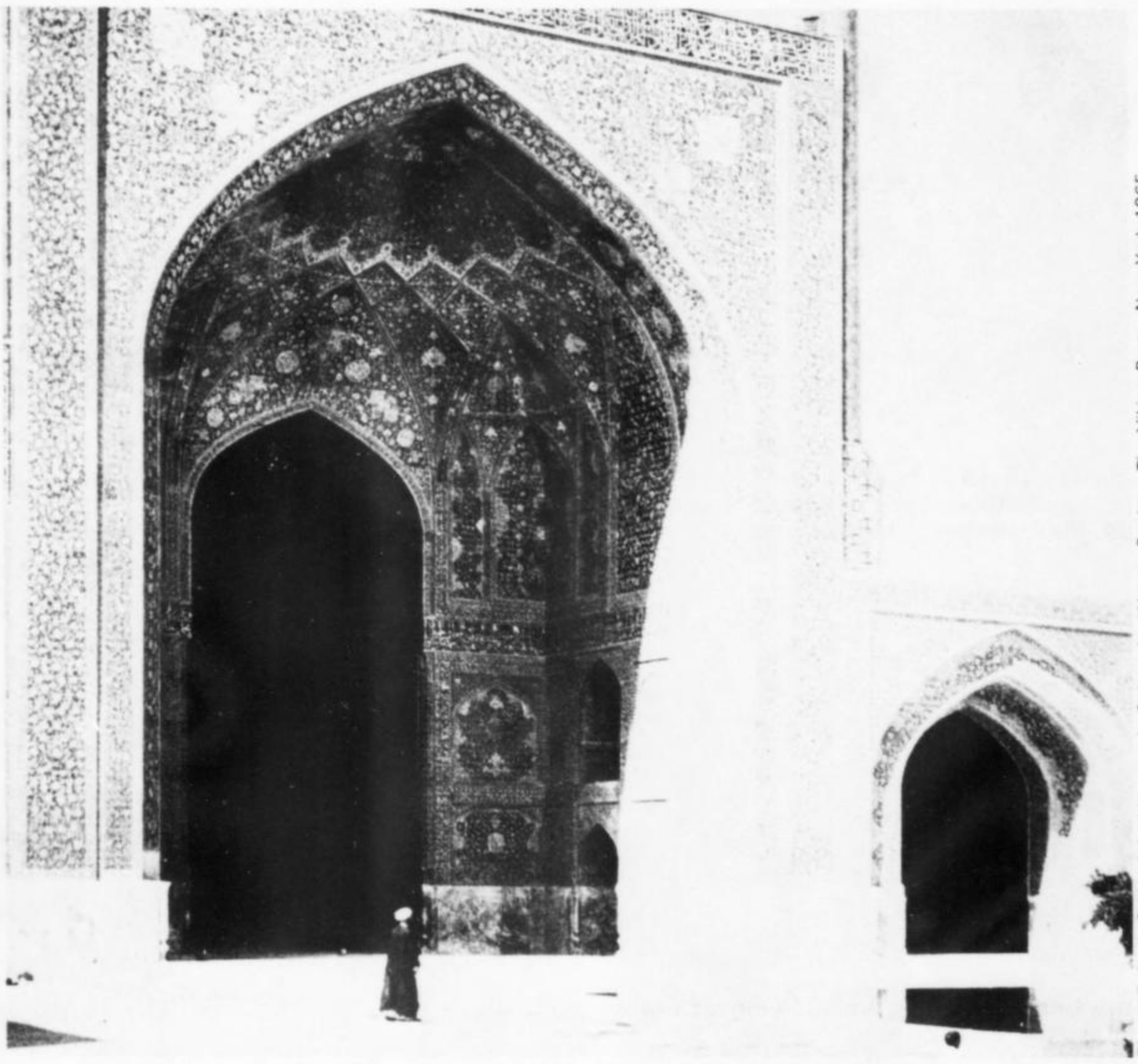


Photo © from *Oriental Architecture in Colour*, by Werner Speiser. The Viking Press, New York 1965.

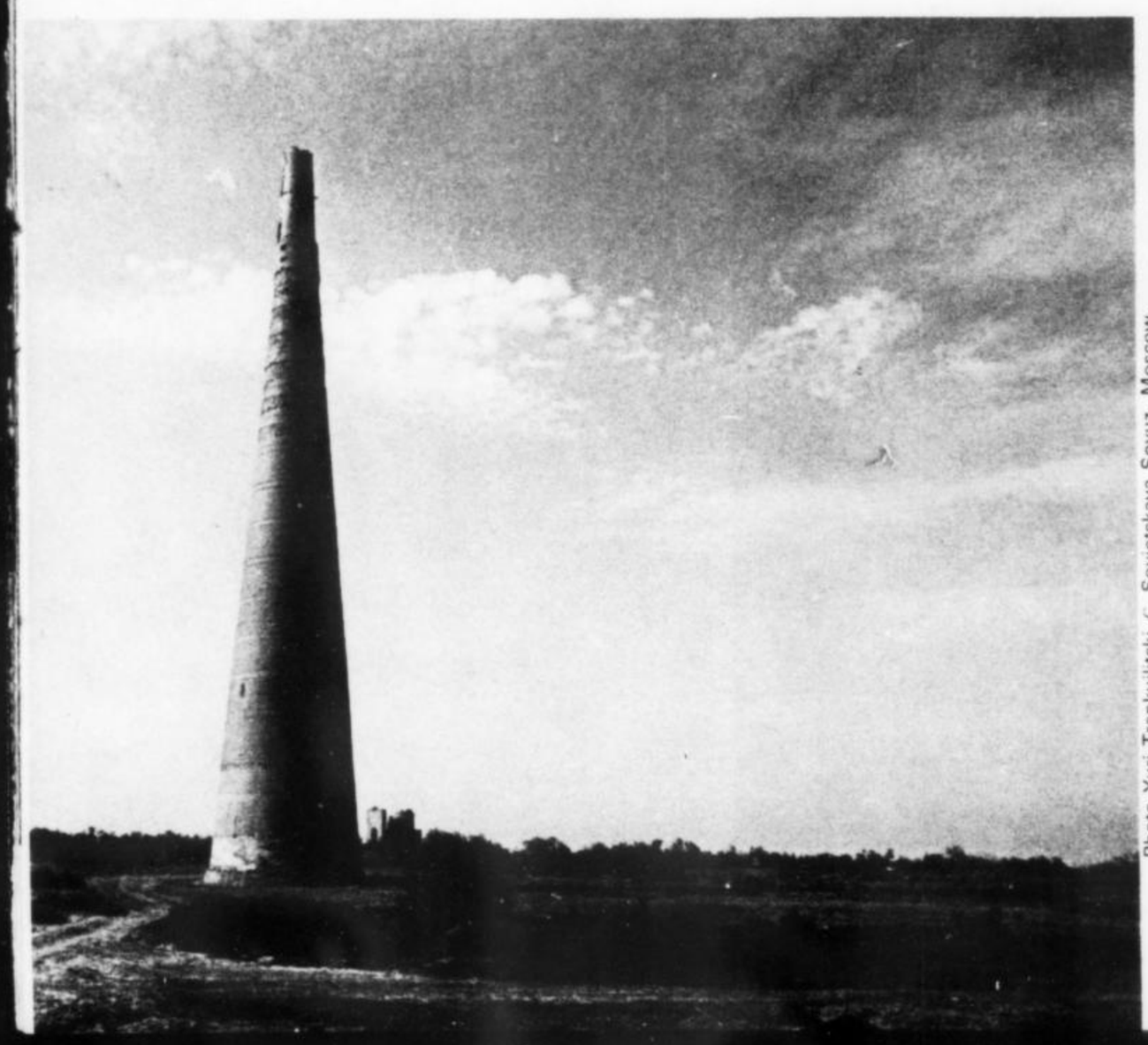


Photo Yuri Trankuilitski © Sovietskaya Soyuz. Moscow.

tyred wheels jarring from the apex of one set to the next like sticks dragging along a fence; the creaking and groaning and chirping and rattling of vehicles... the jangling of chain harness and the clanging or jingling of every other conceivable thing else, augmented by the shriekings and bellowings... raised a din that... is beyond all conception. It was not any such paltry thing as noise. It was an immensity of sound.

The everyday sounds of the past were different, yes, but not necessarily preferable, as we are often tempted to suppose, to those of today.

Nevertheless, the city dweller who retreats to the rural countryside, or anyone who sojourns for a time in the wilderness, rightly supposes that the change of locale brings him in contact with earlier or previous soundscapes. It is difficult wholly to escape the everyday sounds of modern life, for the internal combustion engine and long-distance communications are almost omnipresent.

But today's natural and rural environments bear at least some resemblance to those of earlier epochs, and by listening to what happens there we can partly recapture the soundscapes of the past. Just how much today's natural or rural sounds replicate yesterday's can not be determined, however. A desire for both authenticity and specificity animates our continuing search for ways to recover the actual sounds of the past.

THE capacity or ability to recapture such sounds is a recurrent theme of imaginative literature. Baron Munchausen describes a winter so cold that a hunter's tune froze in his bugle, emerging as audible notes only the following spring. Rabelais's Pantagruel, sailing on the confines of the Frozen Sea, is amazed, while seeing nothing, to hear a great din—the booming of cannon, the whistling of bullets, the shouts and groans of men, the jostling of armour, the clashing of battle axes, the neighing of horses; all these sounds of a great battle, fought there the previous winter, had frozen in the air and were only now tumbling down and melting into audibility.

The "Journeyers to the East" in Hermann Hesse's *The Glass Bead Game* include itinerant instrumentalists and minstrels whose "mystic identification with remote ages and cultural conditions" enabled them "to perform the music of earlier epochs with perfect ancient purity... exactly

CONTINUED PAGE 20

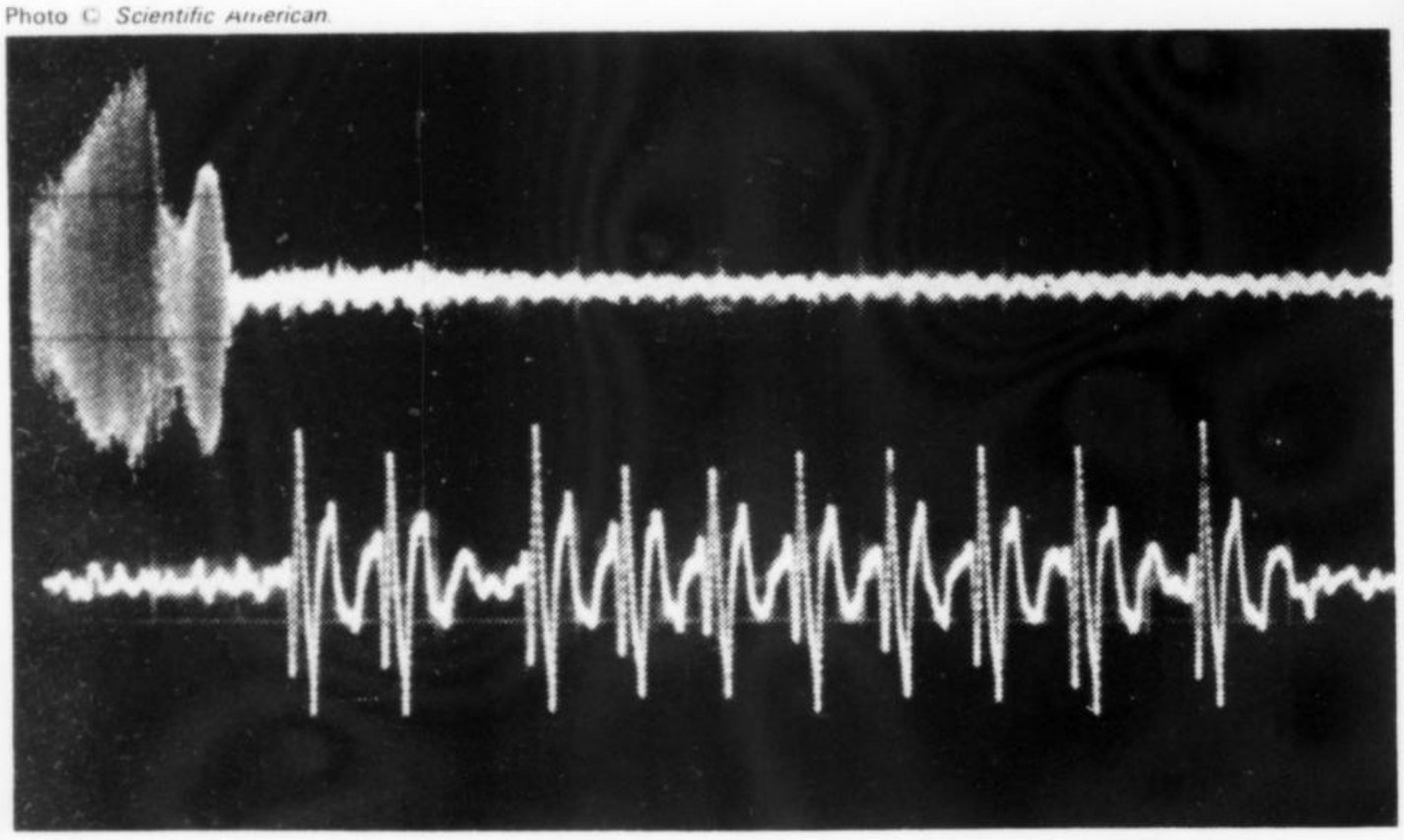
Photo © Studio Natiris, Cébazat, France.

GRASSHOPPER VIRTUOSO. Like a violonist using his bow, the grasshopper rubs its thigh, equipped with a toothlike ridge (above) against the sides of its abdomen, thus producing its characteristic "song".

On insect 'wings of song'

BATS, MOTHS AND ULTRASOUND. Bats find their prey while flying at night by emitting ultrasonic cries and locating the source of echoes.
Some moths can detect the cries and then take evasive action.
Photo below shows oscilloscope tracing of a bat's cry and a moth's response to it.
Pattern at left of top trace shows bat's cry.
Reaction of the moth's acoustic cells produced row of spikes at bottom.

Photo © *Scientific American*



CRICKET'S MUSICAL 'FILE'.
Only the male cricket produces sound. It chirps by rubbing an upturned "scraper" on one fore-wing along a "file" or thickened vein with crossridges on the underside of the other fore-wing. Photo above, taken through a microscope, shows a cricket's musical "file".

SPIDER'S LYRE. Is the spider deaf? It was always thought that the spider had no hearing organ, but then tiny slits stretched from a fine membrane linked to sensory cells were discovered on the insect's feet. Some scientists believe that these lyre-shaped organs, sensitive to vibrations, may be a kind of foot-mounted ear.

BUG'S BREASTPLATE. The bug stings its victims with its rostrum—a kind of beak. This instrument also, amazingly enough, enables it to "sing". The bug scrapes it against minute grooves on its thorax (below) to produce its "stridulation".

Photos © Studio Natiris, Cébazat, France.

CONTINUED FROM PAGE 17

as if all the subsequent modes, refinements, and virtuoso achievements were still unknown."

One archaeological dreamer surmises that, by analogy with the sound that needles re-evoke in record grooves, the voices of plasterers of past millennia may be caught in the masonry of ancient walls and temples, awaiting only the proper stylus to come to life once more.

The desire to regain audible history bespeaks the power of sound to transport us back to the past. To hear, or even just to remember, a familiar tune, can instantly call to mind long-vanished scenes and events.

The playing of childhood melodies was said to have triggered fatal outbreaks of nostalgia among Swiss soldiers serving in France and Belgium during the 17th and 18th centuries. The *Kühe-Reihen* or *ranz-des-vaches,* rustic tunes to which herds were driven to Alpine pastures, revived Swiss recollections of their homeland.

The tune, "a fragment of the past," as the Swiss essayist Jean Starobinski puts it, "revives in the imagination all our former life ..."

Music is not the only sound to arouse such memories; the bubbling of springs and the murmuring of streams, even certain vocal inflections, can also be evocative. Indeed the 19th-century French novelist, Etienne Pivert de Sénancour, felt that "the sounds emanating from sublime places make a deeper, more lasting impression than do their visual features." The significance of sound dominates the inhabitants of American author John Updike's imaginary planet, Minerva: "an elderly Minervan wishing to memorialize his life, would remember it almost exclusively in terms of music he had heard, or had made."

Any sound, if memory is vivid, evokes the past. But certain sounds in particular induce us to sense them as old, stemming from antiquity or surviving from a remote past.

Real or fancied similarity to some known work persuades us to link new music to some past epoch. Even the use of a particular key may evoke the musical past.

Thus long accumulated associations with major and minor modes make it difficult for some cognoscenti, according to Gerald Abraham, to "hear B minor without our subconscious being stirred by memories of the *Kyrie* of Bach's *Mass,* the first movement of the *Unfinished Symphony,* and Tchaikovsky's *Pathétique.*"

The timbre as well as the structure of music may suggest the past. Certain instruments, whatever their actual age, produce tones that are generally recognized as archaic. The recognition stems from our expectation, based on a mixture of experience and belief, that early musical instruments were characteristically thin, reedy, quavering, or nasal; from the absence of a well-tempered pitch; or from certain acoustic properties—the castrato voice, for example—that are no longer to be found.

THE presumption of antiquity may be mistaken: not many early instruments have the archaeological authenticity of the Ukrainian mammoth bones, so cut and shaped that Soviet scholars could deduce that Cro-Magnon man 20,000 years ago used them as percussion instruments; modern tests on them, as Sergei Bibikov describes in the "Unesco Courier" (June 1975), yield "hard, resonant, and musically expressive" sounds.

But many so-called early instruments are in fact copies or reconstructions of originals; we have little firm evidence about how early music sounded; some modern music is intentionally written for antique instruments or set to deliberately anachronistic language, like Stravinsky's *Lyke-Wake* Cantata.

A presumption of antiquity also attaches to sounds that seem worn, flawed, or partly obliterated. Such tones strike the ear as being either products of ancient forces or end results of processes of decay. A scratched record, a muffled church bell, and a wheezy car engine give the illusion of having come from long ago because their tones suggest much prior use. A cracked or quavering voice conveys a sense of time past because we may assume it belongs to an old man or woman.

Words sung or spoken may be another high road to antiquity. Songs, chants, and other vocalizations connote age when they employ antiquated language or refer to historical personages or epochs. References to bygone persons and places, obsolete vocabulary, and archaic musical style and instrumentation converge to create compelling illusions of antiquity, as in Gregorian chants.

Words or eroded sounds often combine with aural memories to conjure up past images. Philip Larkin's novel *Girl in Winter* describes how recorded music can evoke a vanished scene:

The record was old-fashioned, and had a tinny quality only partly due to the needle. The tune it played had been popular for perhaps a week or two, or perhaps even for as long as a musical comedy had run in London, but was now quite forgotten. The orchestra that played it did so in what had been the fashion of the moment, with little empty tricks of syncopation that recalled the outmoded dresses of the girls that had danced to it. It was strange to think it had once sounded modern. Now it was like an awning propped in the sun, nearly white, that years ago had been striped bright red and yellow.

The content and condition of the musical reproduction together suggest outworn tastes, frayed and faded fabrics, evanescent popularity.

Auditory like visual experience often makes natural things seem previous to man-made ones. Rocks, trees, lichen may look older than houses or highways because we assume that nature generally antedates artifice. The sounds of nature may similarly suggest a primeval scene.

For Larkin's antagonist, "as far as age was concerned, sheer age that was almost timelessness, the sound of trees was more impressive" than an ancient Oxford church. "The surrounding treetops settling and unsettling with an endless sifting of leaves ... filled the air with the whispering of eternity, ... making this place, famous as it was, like all other places."

But the rustle of wind in trees, like the atavistic charm of breaking waves, is not so much ancient as it is eternal. Such sounds betoken not the historical past but the primordial scene, a time *previous* to history.

The sounds of decay, like its visual images, also evoke a feeling of desuetude. A crumbling stone wall,

an ivy-covered building, a mossy roof are felt to be old because they are apparently weathering back to age-old nature. Similarly, tunes, speech, and other man-made noises patterned after the sounds of nature or decaying so as to resemble them impress hearers as akin to primeval.

We tend to assume that sounds distant in space are also remote in time; far away and long ago seem intimately interwoven. The experience of echoes bears this out in paradoxical fashion. As reverberations in amplified space they echo sounds further away but *after* the original sound.

The growth of interest in sounds stemming both from nature and from the human past mirrors increasing disenchantment with the noises felt to be most characteristic of the present day.

And a preference for the aural past goes beyond music; it questions the quality of the whole modern soundscape. The broad-gauge blur of the machine-dominated environment creates sounds that are inherently boring. "In the past the trains either whistled more or we heard them better," reminisced one old lady about the 1920s. "They had more personality."

This is the quality that makes so many sounds of the past a precious legacy, now in danger of being lost through obsolescence, and that gives purpose to the World Soundscape Project's effort to record certain sounds before they vanish (see page 4).

Such sounds include the ringing of old cash registers, washing clothes on a washboard, churning butter, a razor being stropped, a kerosene lamp, the squeak of leather saddle bags, hand coffee grinders, milk cans rattling on horse-drawn vehicles, heavy doors being clanked shut and bolted, school hand bells, wooden rocking chairs on wooden floors, the quiet explosion of old cameras and hand-operated water pumps.

A special auditory quality often associated with the past is silence. We are so accustomed today to pervasive background noise that when it is absent we feel transported into another time, the past if we were accustomed long ago to the absence of noise, the future if we have never experienced certain surroundings without it.

Critical reactions to the present soundscape help to make us aware that the audible environment has a temporal character. Just as concert audiences have grown used to hearing chronologically sequential programmes, so does the whole sonic world begin to acquire historical markers.

We tend more and more to date the distinctive elements of the soundscape medley: the crash of waves and the wind in the trees seem eternal; bird-song is both seasonal and cyclical; voices seem either old or new depending on their age and familiarity; traffic sounds are placed in time because we have experienced, or heard recordings of, trains and cars and planes of various vintages; music and Muzak have temporal connotations that differ depending on where and how we hear them.

Even when we do not consciously attend to these sounds their temporality affects us. As we keep incorporating past sounds into our present lives, the auditory medley takes on an increasingly diachronic character. We hear in the present but simultaneously recognize elements, tonalities, and themes from many pasts.

What can be concluded from all this? Given our present level of technology, past sounds, strictly speaking, appear to be irrecoverable. Sounds persist only in memory, often evoked by associations, and in their influence on imagination.

What we can reconstruct from indirect evidence, however, suggests that in many important respects past soundscapes differed substantially from those of today. It is partly because of these differences that we remain so strongly attached to sounds that we consider to be antiquated, whether or not they are truly old.

■ **David Lowenthal**

FOR FURTHER READING AND LISTENING

- **The Vancouver Soundscape,** edited by R. Murray Schafer. A study on Vancouver's sound patterns over its 100-year growth, accompanied by two LP records recreating aspects of the soundscape. (See article page 4).

- **Sound Sculpture: A Collection of Essays by Artists Surveying the Techniques, Applications and Future Applications of Sound Sculpture,** edited by John Grayson. Collection of over 30 articles and essays describing the evolution of sound sculpture and introducing all its current forms. 196 pp. ($ 18.95). See page 28.

- **The Sounds of Sound Sculpture: A Cross Section Representing Three Decades of Sound Sculpture.** An A.R.C. record accompanied by "The Sounds of Sculpture", a booklet providing descriptions and photos of the sound sculptures heard on the album. ($ 6.95).

- **Environments of Musical Sculpture You Can Build,** edited by John Grayson. How to invent and build your own new musical instruments and "sound sculptures" (see page 28) using ready-to-hand materials. ($ 18.95).

- **Pieces: An Anthology,** edited by Michael Byron. An easy-to-sight-read anthology of compositions for drum and percussion ensembles, shakuhachi (Japanese bamboo flute), voice and harp, solo voice, solo clarinet and numerous works for piano. 176 pp. ($ 18.95).

- **Suitable for Framing: Compositions for Two Pianos and South Indian Mrdangam.** An A.R.C. recording. ($ 6.95).

Forthcoming titles from the World Soundscape Project (see page 4).

- **Five Village Soundscapes in Europe,** edited by R. Murray Schafer. A study on the soundscapes of villages in Sweden, Germany, Italy, France and the U.K., accompanied by two LP recordings.

- **A Dictionary of Acoustic Ecology,** edited by Barry Truax.

- **European Sound Diary,** edited by R. Murray Schafer. Excerpts from the diaries of world soundscape researchers.

- **The Art of Drumming: South Indian Mrdangam,** by Trichy Sankaran. (Foreword by Palghat Mani Iyer). Basic knowledge on the technique and theory of South Indian drumming presented to Western readers. All books and records are published by the Aesthetic Research Centre of Canada (A.R.C.). Send orders to: A.R.C. Publications Distribution, P.O. Box 3044, Vancouver, B.C. V6B 3X5. Canada, or contact your local book and/or record shop. **Please do not send orders to Unesco.**

EARLY MAN GOES THROUGH THE SPEECH BARRIER

by Aleksey A. Leontyev

THE ancient Greeks believed that field mice could read and therefore used to scratch messages on stones asking the mice to keep out of their fields. Legends about speech and sound persist among many peoples of the world. There are several Russian folk tales in which the hero tries to learn the language of birds and beasts as well as the languages of other peoples.

In one such tale, for instance, the hero's parents send him out into the world "to learn many different languages from a wise man so that he may know what the bird says when it sings, the horse when it neighs and the sheep when it bleats."

Animals live in the same world of sounds as man: the sounds, firstly, of inanimate nature—the whistle of the wind, the thunder of the waterfall, the rumble of the avalanche; the sounds of other living creatures—the song of birds, the shriek of the howler monkey, the snarl of the tiger; and the sounds made by man and by man-made things.

It is the same world of sounds, but yet completely different: animals are, as it were, completely separated from that world by an impenetrable psychological barrier, a filter which lets through only certain sounds. They hear sounds but heed only those which are in some way connected in their consciousness with their own vital needs, those which have significance as a *signal.*

The female nightingale appreciates the singing of the male as a signal of the forthcoming satisfaction of its sexual needs, whilst to a prowling cat the same song conveys quite a different message—a meal in the offing. The roar of a tiger is a danger signal for all other living creatures.

To an animal, human speech is just another, more complex signal, another element of reflex behaviour. Even such domesticated animals as dogs, which sometimes appear to understand everything that is said to them, are in fact responding to the sound of the words (*not* to the sense of those words) as research by the eminent Dutch animal psychologist F. Buytendijk and the Soviet physiologist Leonid Voronin has shown.

The essential difference between man, even primitive man, and animals is that man does not submit passively to nature but pits himself against it. He joins forces with others, helps them and is helped in return. He uses things made by others and cooperates with them in transforming his environment. A new world thus emerges, the world of man and of man's achievements, material and spiritual, the world of human *culture.*

Sound too forms part of this emergent culture. Primitive man needed sounds in order to organize collective labour. Whereas among animals sound is identified with needs, with man it became identified with *activity.*

It would be interesting to know what these first truly human sounds, the primitive speech of Neanderthal man, were like. Early man obviously had the necessary vocal apparatus, but its functions were limited: the edges of the vocal folds, or true vocal cords, had not yet curved round and the passage between the larynx and the oral cavity was narrow, while the soft palate was further away from the back of the larynx than in present-day man.

This means that the speech of Neanderthal man must have been accompanied by a lot of inharmonious, piercing, high-pitched noises—whines, screeches, squeaks, etc.

This, however, was not the most important characteristic of primitive speech. Soviet anthropologists who have studied the shape of the cerebral cavity in the skulls of our early ancestors have come to the conclusion that by Neanderthal times the fronto-temporal region of the cerebral cortex, which is responsible for organizing external stimuli, images and signals into a coherent order, was becoming highly developed.

This development signified a revolutionary change. Man had hitherto simply allowed sound to break over him like the waves of a great ocean, distinguishing only certain "splashes" of sound which carried some vital message for him.

But when sound acquired a social significance, man had an objective criterion for comparing different social sounds with each other: sound became to some extent independent of the perception of a particular human being, and acquired an objective content which was the same for all hearers. Only then could man cap-

CONTINUED PAGE 25

ALEKSEY A. LEONTYEV, *head of the department of Methods and Psychology at the Pushkin Institute of the Russian language, in Moscow, is a leading Soviet specialist in linguistics and psychology. He is the author of 10 books and over 200 papers in these fields, many of which have been widely translated, and was a contributor to* Foundations of Language Development, *a two-volume work published under Unesco's auspices in 1975.*

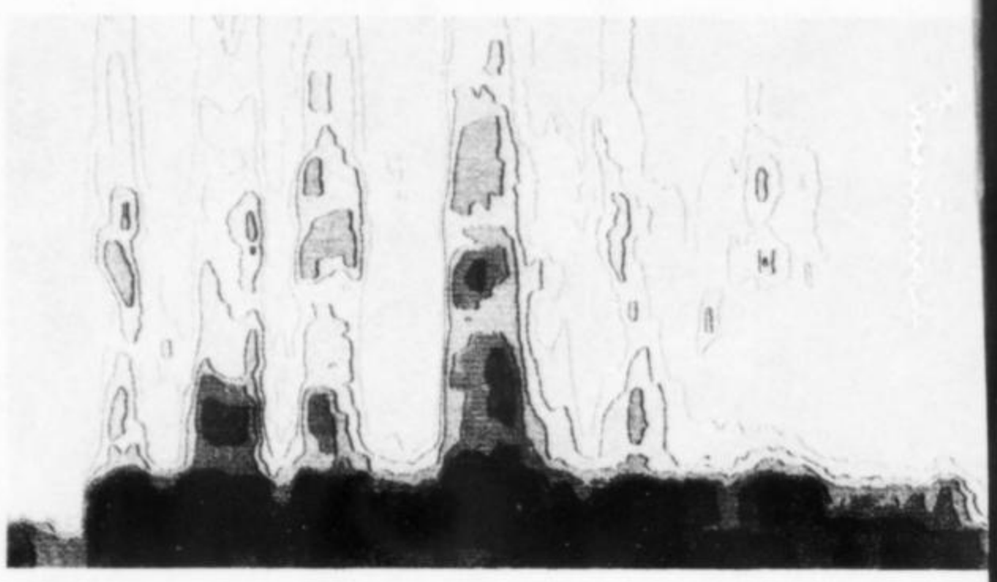
Photo © Raghu Rai, New Delhi

Photo © Hoa-Qui, Paris

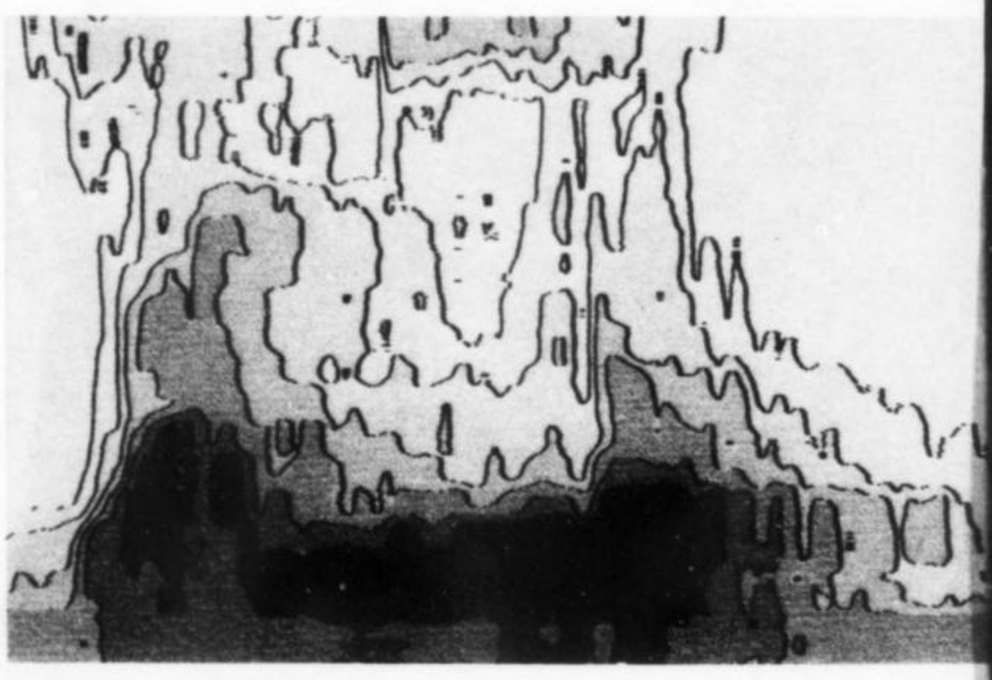
Photo René Caloz, Paris

MASKED VOICES AND SPOKEN SIGNATURES

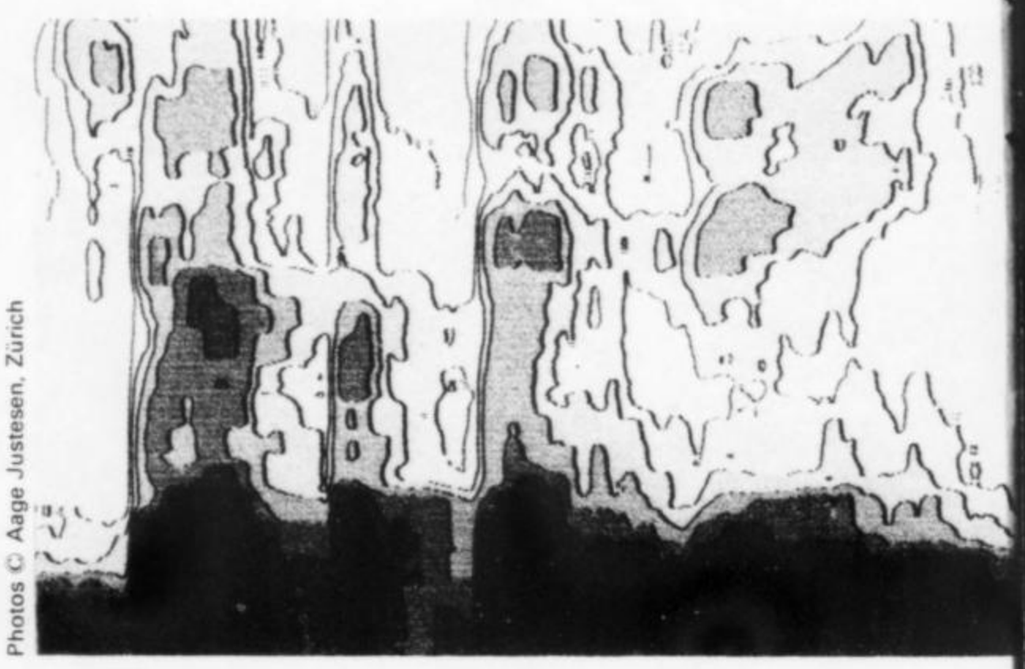
For centuries the plastic arts depicted the human voice simply as an open mouth, suggesting the spoken word or a cry, as in the head surmounting this pottery vessel from Zaire (left). Below, decorative mask carved in stone and symbolizing tragedy, in the ruins of a Roman theatre at Demre (Turkey). Like their Greek counterparts, Roman actors wore masks, pierced with enormous gaping mouths, indicating the nature of the characters they played. Recently a Swiss musician and painter, Aage Justesen, has succeeded in giving the human voice visual form. The vibrations of the voice can be recorded as a series of irregularly-shaped overlapping surfaces which are then photographed. Justesen has used this process to record famous contemporary figures pronouncing their own name and has given the name "pictonoms" to the resulting "spoken signatures". Below, in descending order, the "pictonoms" of the celebrated violinist Yehudi Menuhin, Sherpa Tensing (the Nepalese who reached the summit of Everest with Sir Edmund Hillary in 1953) and the Spanish painter Joan Miró.



YEHUDI MENUHIN



TENSING NORKAY



Photos © Aage Justesen, Zürich

JOAN MIRÓ

CONTINUED FROM PAGE 22

ture sounds and compare them with other sounds, only then could he put two meaningful sounds together. Thus he acquired the faculty of *speech,* the faculty of communicating with others.

As primitive man's activities became more varied and complex he began to acquire a faculty which he had previously lacked, that of perceiving his own actions as a chain of separate but sequentially linked operations. Previously he had to indicate his activities by means of single, unarticulated sounds, but now there was no longer anything to prevent him articulating different sounds to compose a complete, coherently developing sequence.

This again represented a revolution in the relations between man and his world, and in his perception of the world: sound now became subjectively linked not with an activity, but with a particular *object* used in that activity. Sounds had become *symbols.*

Words now began to represent only that aspect of things which is of practical utility. They conveyed ideas about things themselves, about the whole category of similar objects and about the variety of functions which such objects perform in social life. As words developed this new role, general ideas about objects began to exist independently of the particular situation in which the object is being used—*concepts* emerged.

The next and vitally important development was the appearance of concepts which were not connected with any tangible object. Joy and sorrow, time and space, life and death have no existence in the world of material objects, but they exist in the world of words and the world of concepts. Thus, thanks to sounds, thanks to words, man could now juggle with the most abstract concepts.

Words were now becoming more and more numerous, but the human ability to pronounce different sounds was still restricted. Such a skill became increasingly necessary as words could now be lifted from their immediate context, that of practical activity, and needed to be recognized, distinguished, demarcated from other, similar words. How was this to be done?

One way of varying sounds is by the pitch of the fundamental tone, but here again the possibilities are limited: the human vocal apparatus, except for that of a Chaliapine, is capable of producing sounds within a register of only two octaves, and the vocal apparatus of primitive man, as we have already seen, was incapable of producing pure musical tones.

A simpler way is to take variations of *timbre*—the pitch and quantity of overtones—i.e. to take as the criterion for distinguishing between different sounds the region in which the characteristic resonance bands determining the quality of a given sound are to be found, a region known as the formant of that sound. The formant does not depend on the fundamental tone with which a particular sound is uttered. The concomitant noises occurring along with consonants are also situated within the limits of particular regions of the sound spectrum.

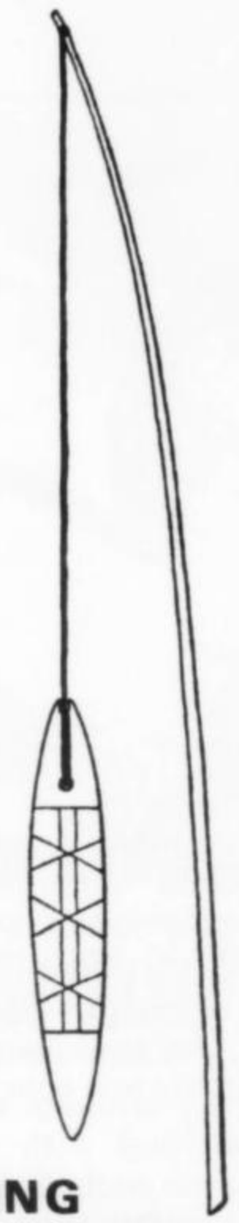
This was the way which nature chose in creating human speech. Each of the thousands of languages in the world has its own system of speech sounds. Each of these systems satisfies at least two conditions: all the sounds in that system are sufficiently well differentiated in their place and manner of articulation. However, only those differences in articulation which produce adequate differentiation of formants, thus ensuring that the ear can distinguish the different sounds, are actually used.

The criteria used for differentiating the sounds of speech vary widely from one language to another. In Russian, sounds are differentiated by place of articulation (labial, dental and velar consonants), by whether they are voiced or unvoiced, "soft" or "hard", and by whether or not the nasal cavity is involved in their pronunciation.

There is no distinction between hard and soft in German, but there is a distinction between strong and weak. The aspirate-non-aspirate distinction is important in Hindi. In Fori, one of the languages of Papua-New Guinea, none of these previous distinctions is made and the important differences are the presence or absence of the nasal glide or the glottal stop at the beginning of a consonant. The length of the consonant is also an important factor.

In the course of his development man learned to organize word sounds into coherent sequences. Why then should he not apply the same principle to organizing sounds *within* the word itself? This would obviously give him even greater opportunities for distinguishing words and in particular for inventing new ones in order to keep pace with the ever-increasing variety of objects and concepts in the world around him.

The task of shifting sounds around and putting them into different orders did not, however, prove easy. Even now it is not easy because of the



Drawing from *The History of Musical Instruments,* W W Norton and Co., New York, 1940

LISTENING TO PREHISTORY

Thousands of years old, this strip of reindeer horn (below) is one of the most ancient musical instruments yet discovered. Covered with geometric incisions and painted with red ochre, it was found in the Dordogne region of France. It bears a strong resemblance to an instrument known as a "bull-roarer" (above) once used in Brazil during certain mystic ceremonies. The bull-roarer consists of a thin board that the player holds by a cord tied to one end and whirls over his head. In whirling, the board also spins around its own axis, thus producing a roaring or wailing sound. Today the bull-roarer is simply an easily improvised toy.

Photo © Musée des Antiquités Nationales, St-Germain-en-Laye, France

need to arrange sounds into basic pronounceable units—syllables. For this reason, a particular sequence of vowels and consonants is obligatory in many languages—the Polynesian languages, Japanese and others.

In those languages where the syllable can end with a consonant, the choice of such final consonants is always smaller than that of initial consonants, and in the languages of South-East Asia—Chinese, Vietnamese, Burmese—these are almost exclusively the so-called sonants. The combination of consonants in a syllable thus always follows a definite articulatory sequence.

To take an example from the Russian language, we have the monosyllabic word "vdrug", meaning "suddenly", but from the point of view of articulation the syllables "drvug" or "rdrug" are not possible words.

Another new world also emerged alongside the world of words: that of socially experienced feelings, expressed in images specially created for that purpose. Primitive art, primitive sculpture and *music* were born.

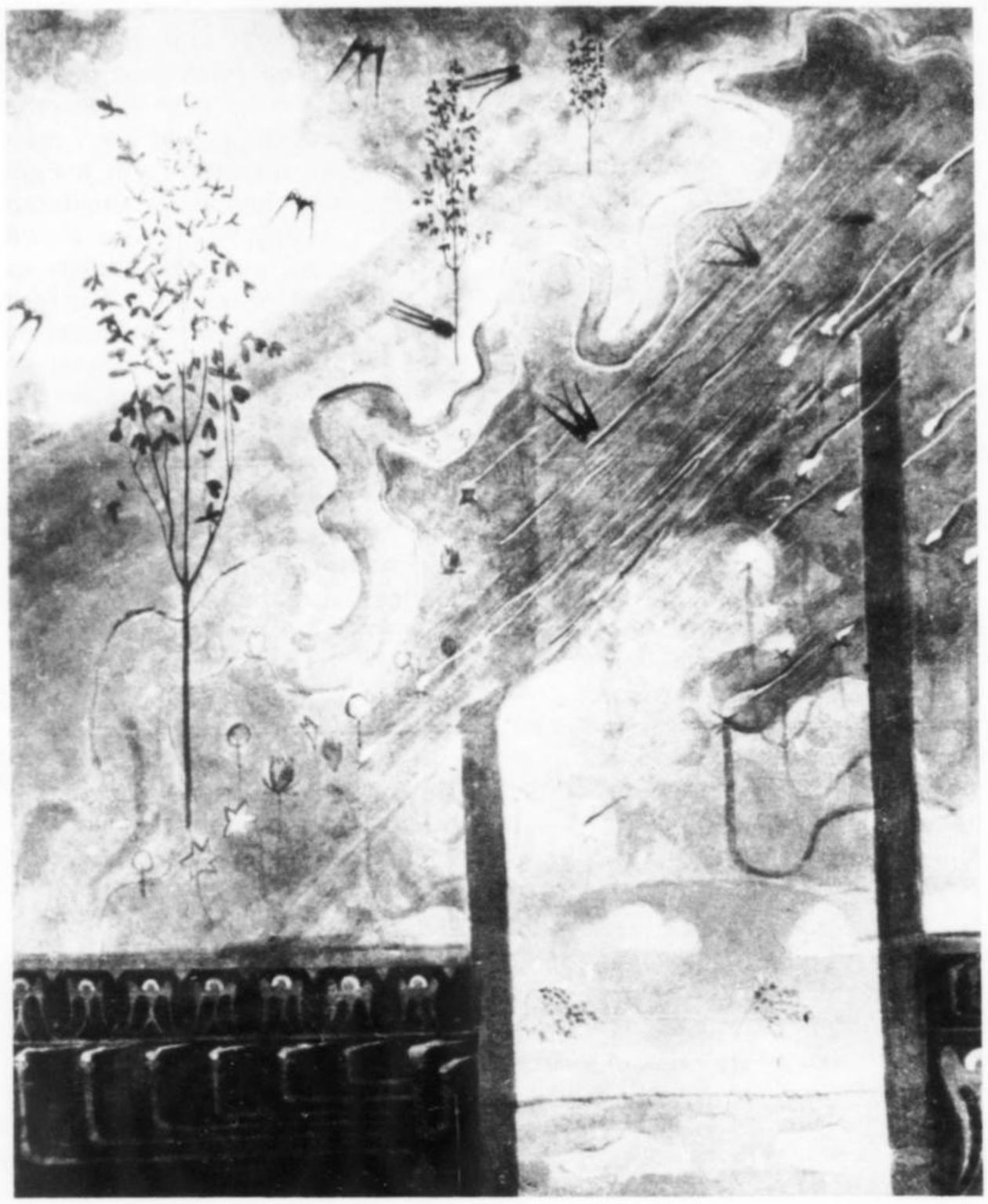


Photo © Aurora Publishers, Leningrad. Churlionis Museum, Kaunas, U. S. S. R.

MUSIC FOR SEEING. The interplay of light, leaves, birds and wind-swept flowers in this drawing explains its title, *Summer Sonata*. It was drawn in 1907 by the Lithuanian painter Mikhail Churlionis (1875-1911) who sought to present the language of music—sonatas, preludes and fugues—in visual terms.

The opinions of scholars differ as to the origins of music. The commonest theory is that man began by mimicking the sounds of nature. But there are no clearly distinguishable differences of pitch in nature, no criteria, that is to say, that the originator of the first scale could work by. Why for that matter did he need to fix, to memorize a sound of a particular pitch in order to compare it with others?

The most likely explanation is that the first sounds of fixed pitch were speech sounds which already had a human significance. Musicologists who have studied the music of present-day peoples with archaic forms of culture, such as the aborigines of Tierra del Fuego or the Vedda of Sri Lanka, have found that singing is the only form of music familiar to them and that there is a striking similarity in the musical structure of their chants, the overwhelming majority of which consist of a sequence of only two or three notes, not exceeding the range of a minor third. The songs of peoples with a more highly developed culture such as the Hausa of Africa have a similar recitative form, a similar sequence of two notes separated by a minor third.

The ability to distinguish the sounds of music thus developed from the ability to distinguish differences of timbre, and is another physiological mechanism peculiar to man. This ability was systematized and developed as music itself developed. Music, however, did not part company entirely with speech. There are many known languages in which differences of pitch help to distinguish different words or even different syllables—Lithuanian and Serbo-Croat, Swedish and Norwegian, Japanese and Ainu, most of the African languages, many of the Amerindian languages, Chinese, Vietnamese, Thai, Burmese, the Austronesian languages and many of the languages of Papua.

Sound was now broken down into separate phonemes and syllables, but in the form of stress or accent it continued its existence. Accent may be even or it may be musical, using differences of pitch, or it may take the form of stress, involving differences of intensity. But there is not a single language, nor indeed a single word in any language, without accent. Accent is a vestigial fragment of the primitive speech sound, but one which now plays a new function.

Speech is, however, more than the sum of the words which compose it. Words flow together into complete utterances and the thing that binds them together, which indicates their special functions (question, exhortation, exclamation), which

shows what elements of the utterance the speaker considers most important, is yet again sound, this time embodied in the speaker's intonation.

Intonation is another vestigial trace of primitive, probably even animal sound: "dumb" animals, although they are unable to imitate speech sounds, can sometimes imitate human intonation quite accurately.

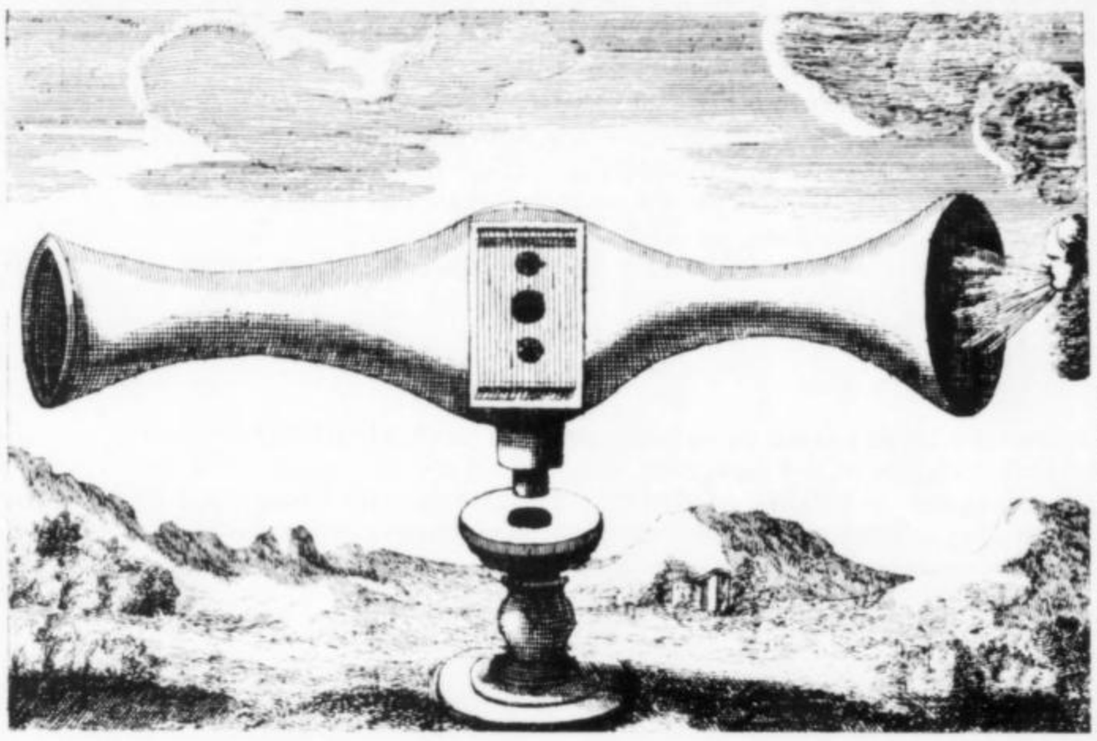
The language of man contains yet another leftover from its animal ancestry: interjections, those inarticulate utterances which facilitate the expression of the simplest emotions—fear, surprise, joy, sorrow, admiration, etc.—without the use of words. Interjections are similar, though not always identical, from one language to another. To express surprise, a Russian says "Akh!" or "Okh!", a Frenchman "Oh-la-la!", an Englishman "Oh!", a German "Ho Ho!", and a Papuan of the Asmat tribe "Woo".

Another ancient stratum of sound in various languages is onomatopoeia. A Russian represents the crow of a cock as "kukareku", a German as "kikiriki" and an Englishman as "cock-a-doodle-doo".

Sound has been socialized, it has become the common property of all humanity, but at the same time it remains an essential element of that which makes each individual human. Sound—the sound of speech—makes all the wealth of knowledge and social experience available to us. Sound—the sound of music—enriches our emotional world. The sounds of man are social sounds and the world of human sound is a social world.

Underlying the system of sounds in any given language is a particular outlook on the world which is expressed in that language, in its sounds, its words and its grammatical forms. To be able to grasp this new, always fresh, always surprising outlook, to see the same world through different eyes, is a great pleasure which is now accessible to more and more people.

■ **Aleksey A. Leontyev**

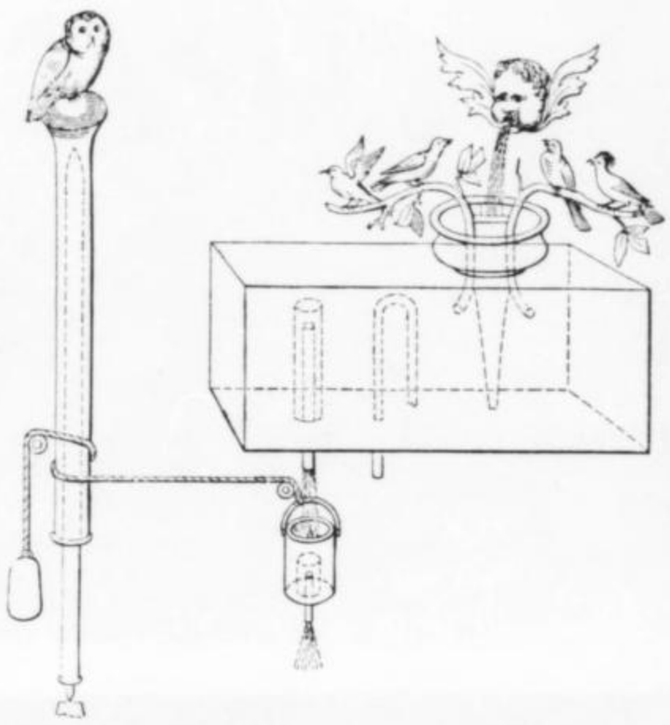


Drawing from *Phonurgia Nova* by A. Kircher, 1673

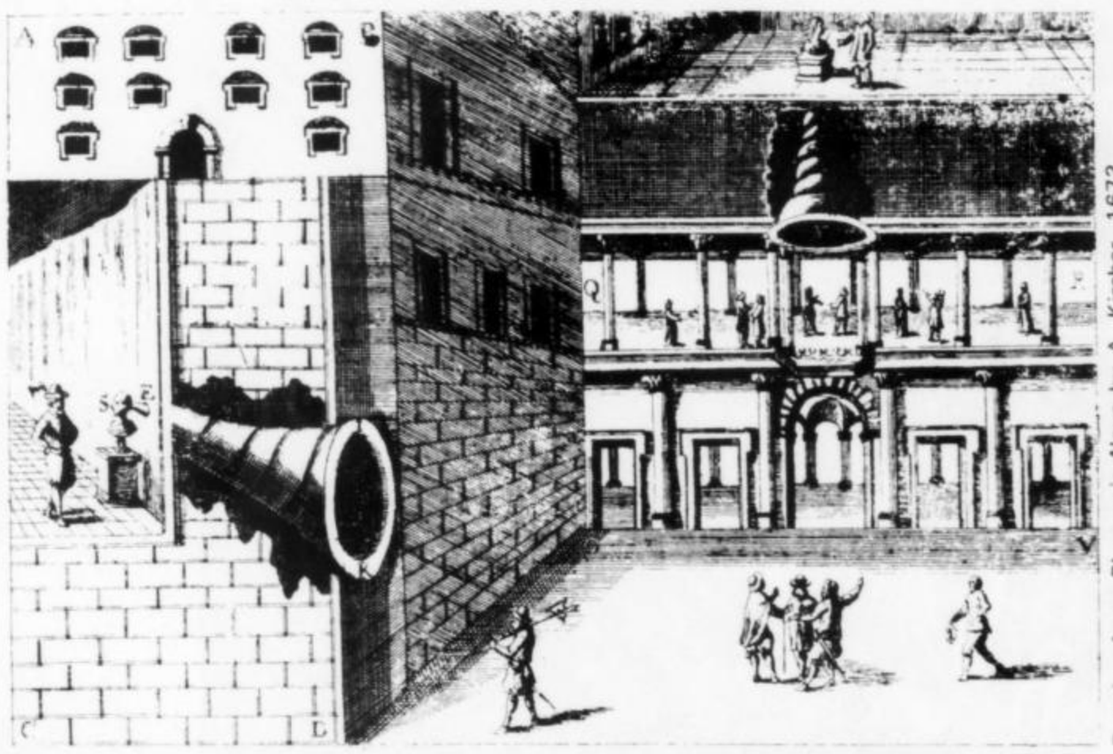
The wind sighing in the trees, ruffling water, beating across vast plains and rushing through narrow mountain gorges produces some of nature's most striking and memorable sounds. In the 17th century a German Jesuit scientist, Athanasius Kircher, widely known for his writings on acoustics and musicology, created this "wind harp", a curious instrument whose strings vibrated in the wind to produce unexpected and mysterious sounds.

WIND, WATER AND TALKING BUSTS

Hero of Alexandria, the Greek mathematician and writer on mechanical subjects who lived in the 1st century A. D. created remarkable "water sculptures" which delighted his contemporaries. In this ingenious example, the water fills the box and drives out the air, causing the birds to pipe different notes. The water is then emptied by means of a syphon causing the owl to turn towards the birds which are now silent.



Drawing from *The Pneumatics of Hero of Alexandria*, MacDonald, London and American Elsevier Inc. New York, 1971



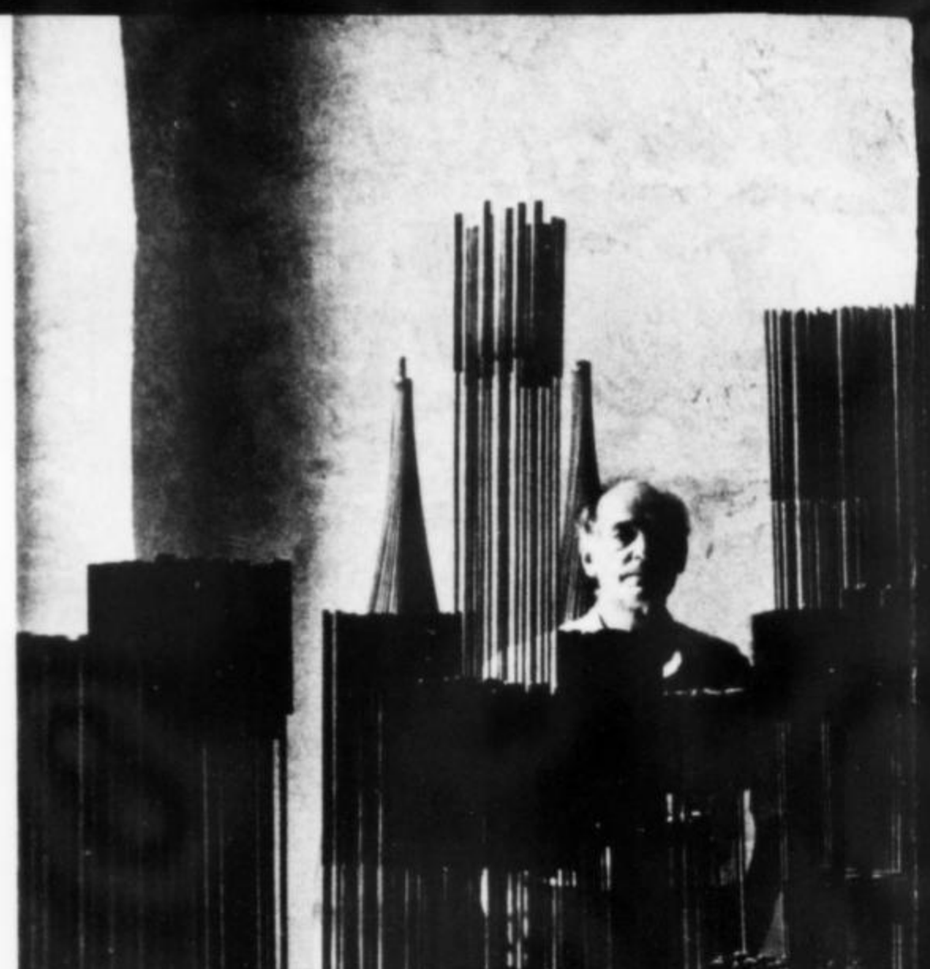
Drawing from *Phonurgia Nova* by A. Kircher, 1673

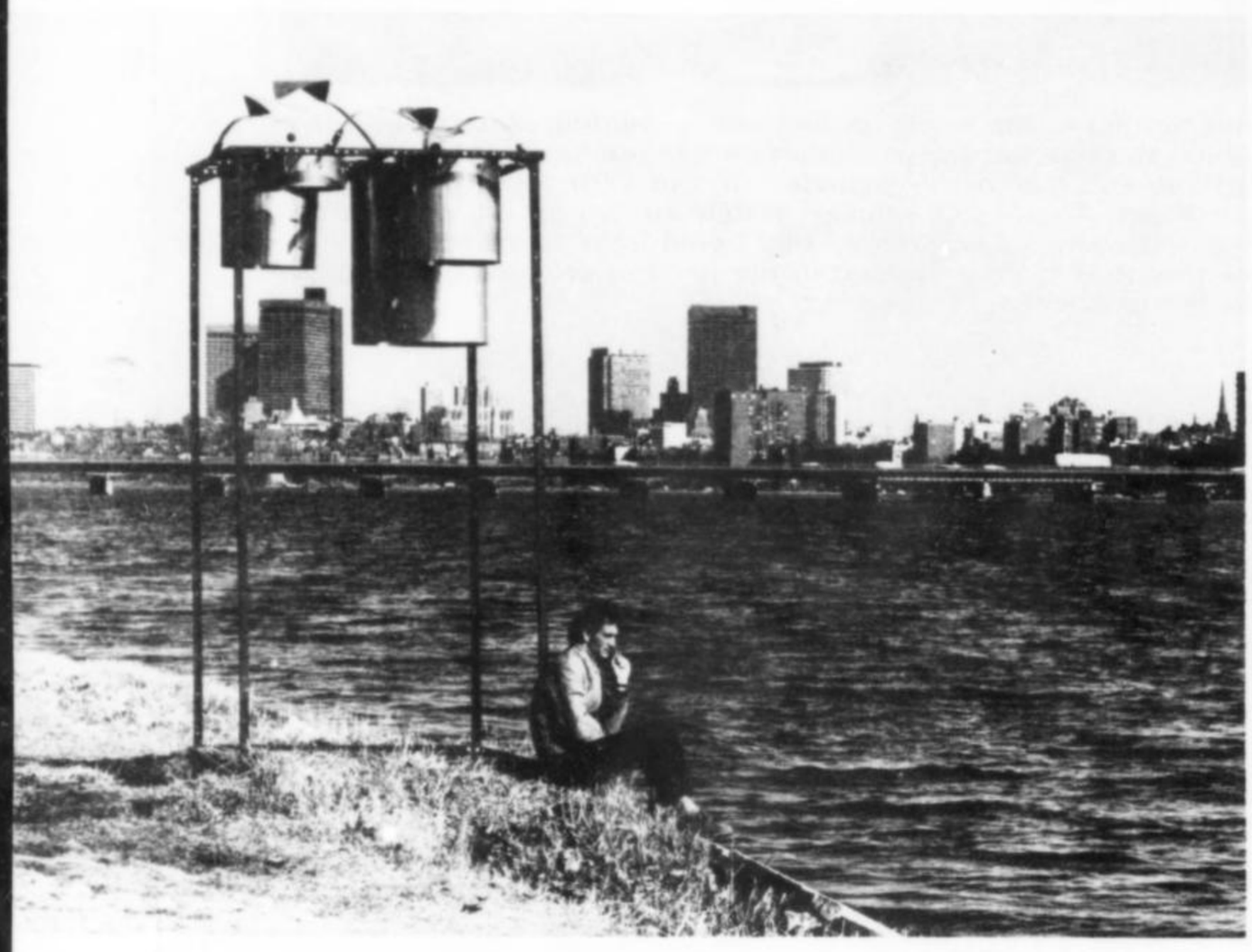
Engraving shows the creation of a sound environment as imagined by Athanasius Kircher, inventor of the wind harp shown above, in his work *Phonurgia Nova* (1673), a mixture of serious scientific exposition and a kind of science fiction. A system of "acoustic horns" funnels street noises to the "talking busts" inside the houses. A modern counterpart exists in the U. S. A. today where a young American composer, Maryanne Amacher, creates experimental "musical" compositions out of natural and urban sounds. Such sounds are relayed live to a concert hall and are blended into spontaneous "musical" performances.

Sounds of sound sculpture

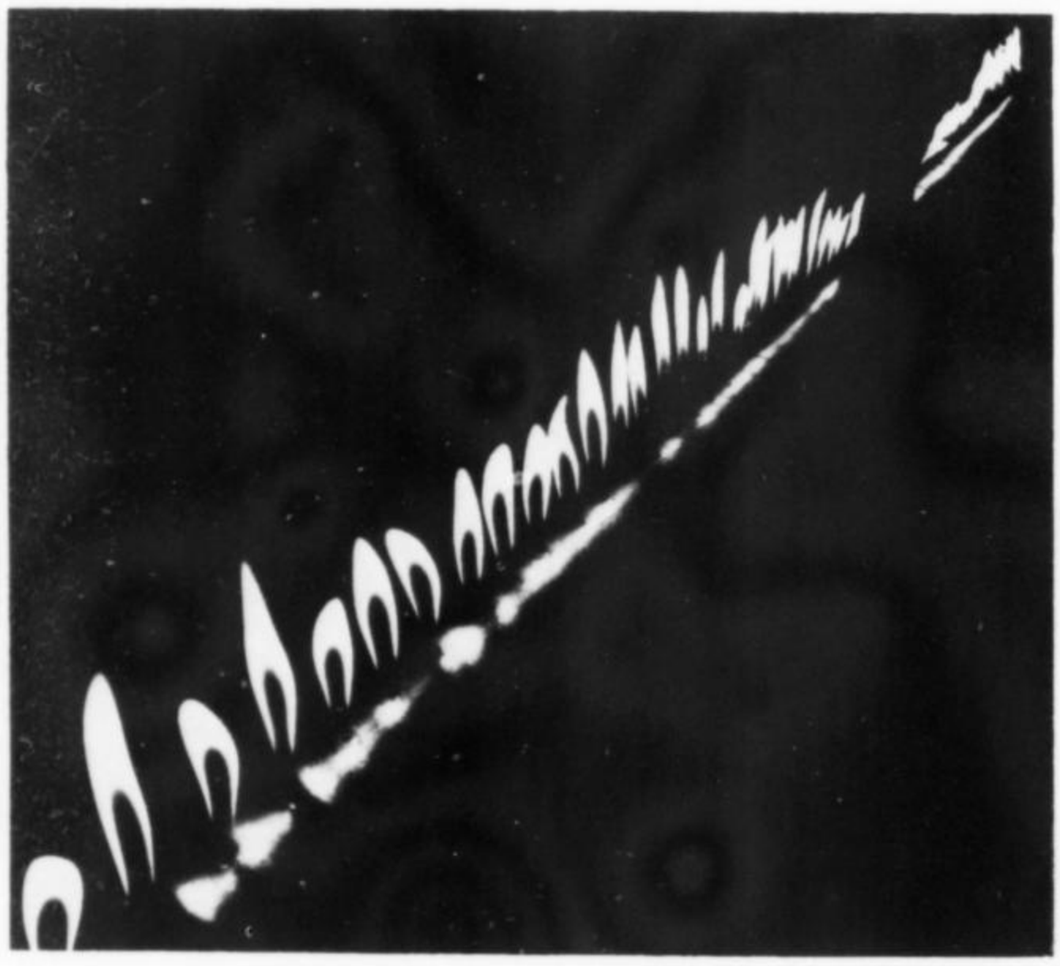
We present on these pages some of the remarkable sound sculptures that have been created since this new art form began three decades ago. How it evolved and how it is developing today are described in "Sound Sculpture" a collection of essays by an international cross section of sound sculptors, published by The Aesthetic Research Centre of Canada, in Vancouver, from which these examples are taken (see also box page 21).

Below, Argentine artist Luis Frangella with a section of his sound sculpture "Rain Music II". Frangella visualises as many as 110 such modules, each with its series of drums, assembled to form roof-like canopies. Moving elements above drums transform impact of rain drops or wind movement into drum beats.

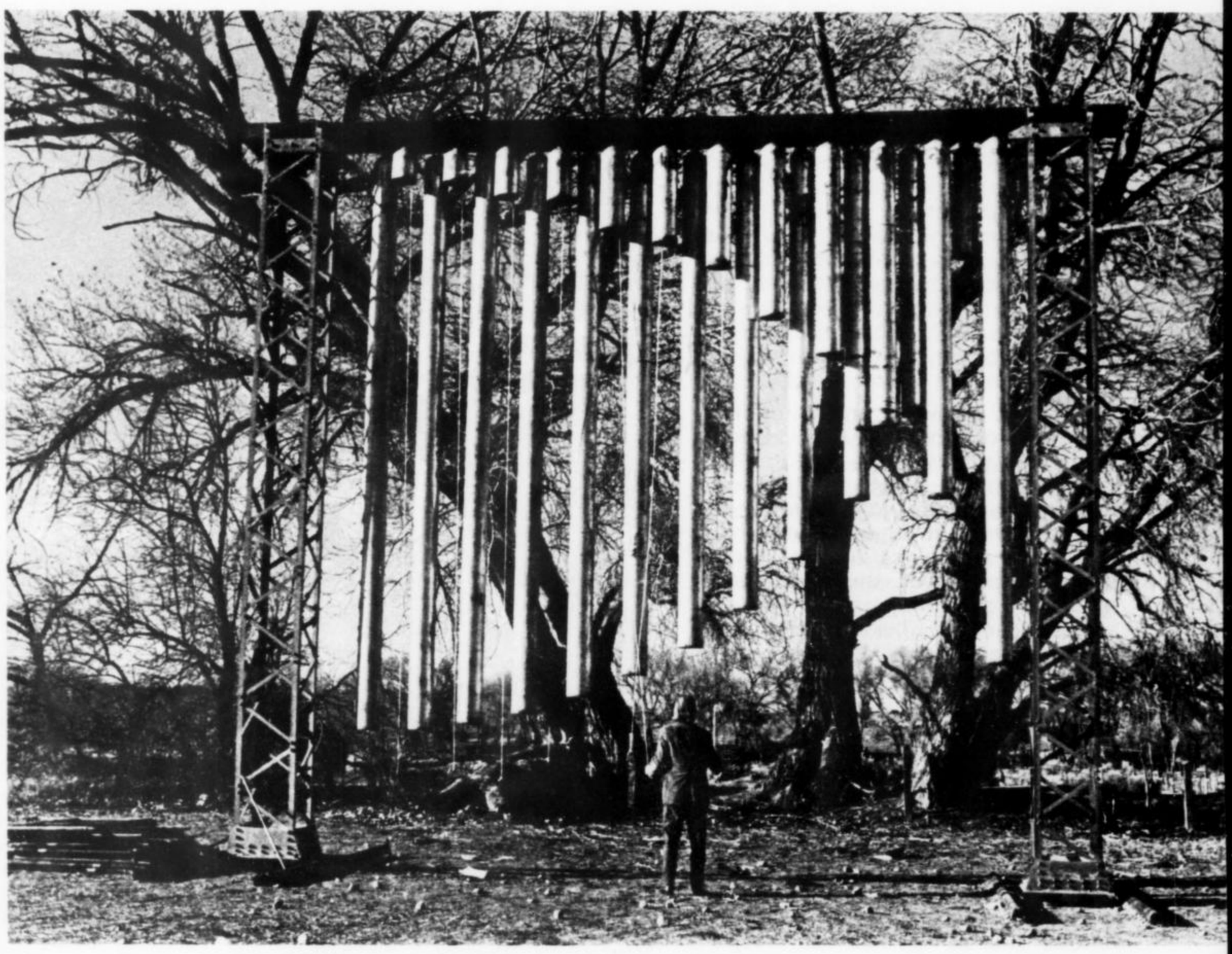




SOUNDING RODS shown above with their creator Harry Bertoia (U. S. A.) are sculptures of varying metals, thicknesses and heights designed to produce tones bearing no relationship to the present musical scale.

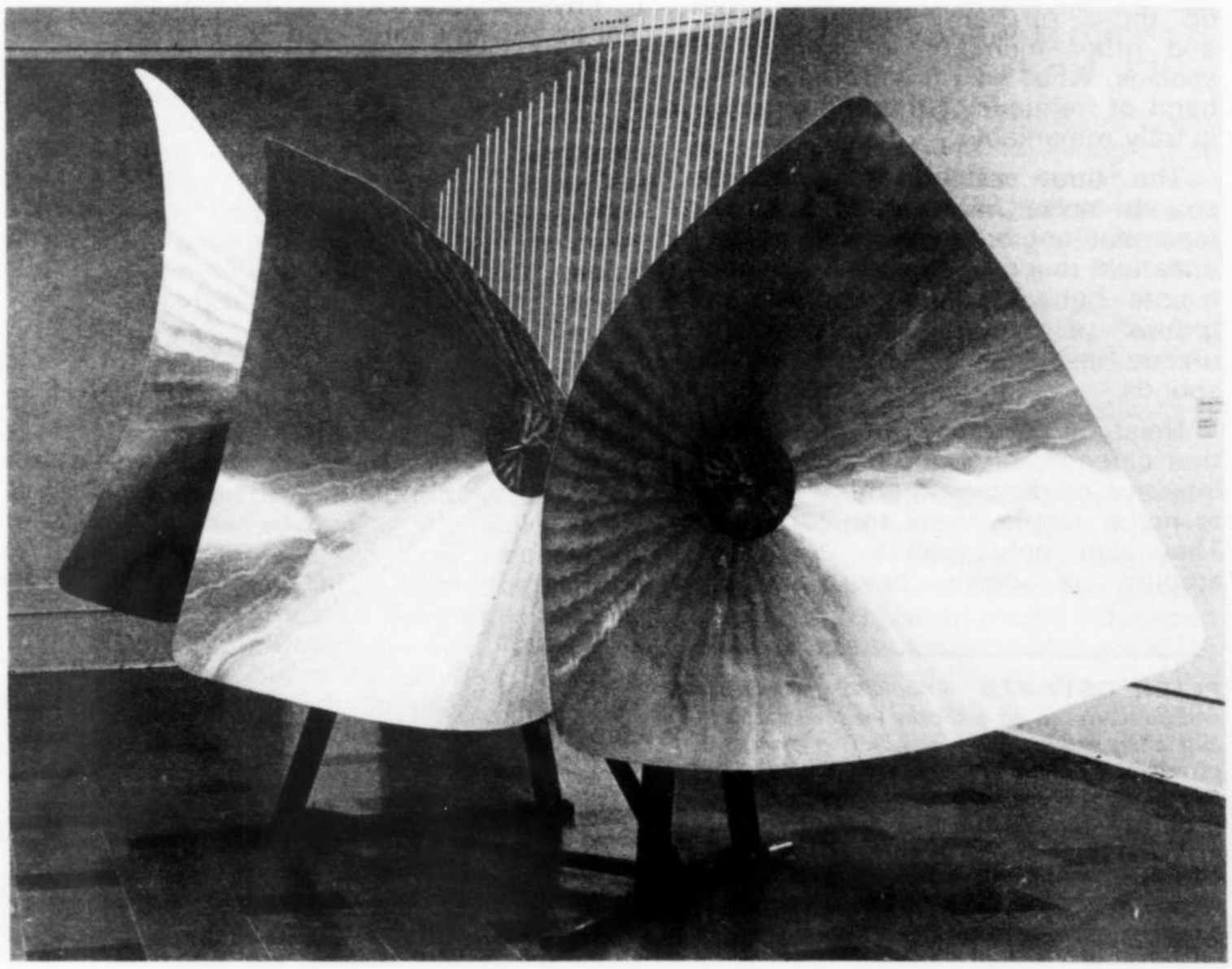


FLAME ORCHARD, a field of fire modulated by electronic music that changes the shape, colour, size or movement of the flames. Its designer is Gyorgy Kepes, head of the Center for Advanced Visual Studies at the Massachusetts Institute of Technology (U. S. A.)



MUSICAL CARILLON by artist Tony Price stands on a piece of scrubland near Santa Fe, New Mexico (U. S. A.). Here it is being played with clappers activated by ropes. The wind also plays it. Its metal cylinders came from a scrap yard.

GOURD TREE AND CONE GONGS with its author the late Harry Partch (U. S. A.). This artist, who used three phrases—magical sounds, visual form and beauty, experienced ritual—to describe the core genesis of his art, has been called the founding father of sound sculpture.



SONOROUS STRUCTURES built by artist brothers François and Bernard Baschet, of France, include this steel and aluminium work entitled "French Monument Born on 57th St". The brothers are pioneers in the integration of new musical sounds with visual forms.

Photos © ARC Publications, Vancouver, Canada.

PSYCHOANALYSIS OF SOUND

by Peter Ostwald

WE all live in an environment of acoustical vibrations from which we take what is useful, informative, and enjoyable for human existence and into which we broadcast a variety of sounds that others may hear and make use of. From the standpoint of the behavioural sciences, the phenomena we call sounds can be divided into three basic categories, the first called noise, the second music, and the third speech. I will try to explore these three realms of sonic experience here from the somewhat specialized perspective of psychiatry.

NOISE. Physically, all acoustical phenomena share certain properties. Sounds are produced by movements and transmitted centrifugally in the form of pressure waves through various media. When such vibratory events impinge on pressure-sensitive receivers called ears, they call forth a variety of perceptions.

As human beings, we are in possession of a remarkably capable auditory system, and while our ears do not react to vibrations much above 20,000 cycles per second as do those of bats, certain insects, and other members of nonhuman species, what we do with the limited band of frequencies that we perceive is truly remarkable.

The three categories of human sounds—noise, music, and speech—represent not only spheres of differentiation in our perception of sonic events but also point to different groups of specialists who deal with unique aspects of the world of sounds.

Noise is generally thought to be that category of sound which has an intrusive or disturbing effect. It tends to make people wince and complain. They can only tolerate a certain amount of noise before feeling tense, irritable, annoyed or actually in pain.

This does not mean that all noise should be controlled or eliminated. One of the great advantages of the Soundscape Project inaugurated by Murray Schafer and his colleagues in Vancouver is that it shows the sorts of noises people become adapted to and learn to live with (see article page 4). A certain amount of discomfort can also result when we are suddenly deprived of the customary environmental noises.

Physiologists used to think of the ear as having a fairly fixed "threshold," and that a sound could not be perceived until it achieved an intensity capable of crossing this threshold for hearing. We now know this to be an overly simple idea, one which may be true for a very small set of relatively pure sounds presented under controlled conditions in a laboratory, but is not applicable to the majority of noises.

Indeed, every sound of nature is a relatively complex physical event, one which must be considered in terms of the duration of time from the onset of vibrations to their cessation, plus the exact waveforms, frequencies, and intensities of vibratory components. Not only may the auditory threshold shift in the course of listening, but even before a sound actually begins, different listeners can have different threshold levels depending on their state of arousal and their expectations.

One reason why noises differ in their effects is that as we focus to listen, our eardrums may tighten up, requiring less acoustical energy to set the auditory system in motion than when the drums are relaxed. Under the condition of auditory attentiveness our ears are maximally receptive, and sounds that are ordinarily ignored may then come into awareness and be labelled as noise. One can easily observe this reaction in the concert hall when a slight whisper by someone in the audience can be distracting and unpleasant to the attentive music-lover.

Acoustical scientists who use instruments to measure sound have discovered that what we call noise tends to have a high intensity—when reaching about 120 decibels a sound actually starts to produce pain—and that in terms of vibration pattern, noise tends to be spread in a fairly dense and irregular way across the frequency spectrum, with a time distribution that is not very predictable. Science also is able to make some fairly reliable statements about how much noise is potentially damaging to the ear as well as to the rest of the human body.

But can the physical study of sound waves totally define what a noise is? No! Some human factors play a very important role in this. For instance, a listener's age seems to determine how much and what kind of sound can be tolerated. Youngsters in general tolerate much more noise than do oldsters, and a cymbal crash or vocal shriek enjoyable for a teenager can drive a middle-aged person quite frantic.

Tastes and styles in listening change from generation to generation. Thus, the engineer with his battery of measuring devices capable of giving objective definitions to various noises, is still left in the end with a subjective definition: *noise is unwanted sound.*

PETER OSTWALD, *American psychiatrist and educator, is an authority on acoustics and linguistics especially as related to problems of mental health and disease. Professor of Psychiatry at the School of Medicine, University of California in San Francisco, he is particularly interested in the psychiatric problems of refugees, displaced persons and victims of disaster. His latest book,* Communication and Human Interaction, *will be published in 1977.*

With this definition in mind, we can turn to some observations about noise which are of psychiatric interest. First of all, there appears to be a strong association between noise and fear. Throughout the course of human history noise has been dreaded as a source of evil power. The ancients thought that noise has death-dealing properties and one finds the idea in primitive folklore, for example, that it is the *noise* of a spear's impact which kills its victim. The Assyrians believed in evil deities capable of producing noises that cause earthquakes and storms.

Frightful creatures are often portrayed as noisy. One sees this characterization not only on the stage where villains shriek and dangerous beasts roar, but also in the behaviour of people who are on the attack.

Noise has been a tool of warfare for centuries. Trumpet blasts and drumbeats incite men to action. The Romans employed a special cadre of troops to make noises capable of frightening and confusing the enemy. The invention of chemical explosives for warfare strengthened this connexion between noise and offensiveness, and during the two world wars, systematic efforts were made to find sounds that can kill.

The technology of destructive sound is paradoxically silent! Ultrasonic beams which can burn and destroy tissue actually are inaudible to the human ear. Used mostly for medical work in ultrasound diagnosis and surgery, this form of acoustical energy does not at the present time pose much of a threat to humankind.

Noise has often been used for therapeutic purposes. Defective or damaged organs give off tell-tale noises, and clinicians must know how to recognize them. Scraping joints, heart murmurs, harsh noises in the chest, gurgling of the intestines—these and many other body noises have been diagnostic signs for centuries, detected first by the clinicians' unaided ears and later by technical means, such as percussion of the chest and auscultation with a stethoscope. Today's specialized methods of phonocardiography can give useful information about heart disease.

Currently, doctors do not believe that excessive noise is particularly good for patients. But it should be mentioned before we go on to the two other categories of sound that there have been therapists who firmly believed in the curative properties of violent acoustical stimuli, mostly in the days when illness was thought to be caused by evil spirits "taking possession" of the body.

To aid in exorcising these invaders, healers would scream and yell at patients, or use instruments to make terrifying noises. The influence of Mesmer, a doctor of the 18th century who believed in animal magnetism rather than evil spirits (and, incidentally, was a practising music therapist) has promoted a much quieter and restrained form of psychotherapy. Yet even today, mostly in nonmedical circles, a so-called "primal scream" therapy is being promoted. It calls for noise as part of the healing process.

MUSIC. I now want to comment on music as a distinctive experience in the world of sound, one that is more pleasurable than noise but unlike speech conveys no precise or linguistic meanings. The highly emotional and desirable connotations of music probably stem from childhood, before communication with words, when an ebb and flow of rhythms and vocalizations bound the infant to his or her mother and song-and-dance was part of socialization through play.

Every human being has a residue of ecstatic feelings tied up in memory with blissful emotions. It can be tapped when the individual is appropriately stimulated, through singing, playing, listening, and participating in music.

Subsequent life experiences have a tendency to emphasize the importance of music for emotional well-being or, on the contrary, to squelch the child's involvement in this form of sonic hedonism. Some children develop a special relationship to music, an art form available in every human culture which offers unique opportunities for imagination and self-expression.

Like mathematics, the other great nonverbal form of thinking that interests many children, music occasionally produces a marvel of nature. This is the child prodigy—Wolfgang Amadeus Mozart or Yehudi Menuhin for example—who can set the world on fire with his extraordinary abilities even before reaching adolescence.

Other musically gifted personalities emerge into the spotlight of public acclaim only when they are big enough and sufficiently independent to forge a career without parental guidance—the Beatles, for example, whose musical taste and even general bearing and behaviour have influenced an entire generation of people in many countries of the world. Devoid of semantics, music is the only language that approaches true universality.

Music-making is a skill that involves specific vocal and/or manual movements, and for this reason is much easier to acquire during the first decade of life. Our mental and ▸

Gala concert!

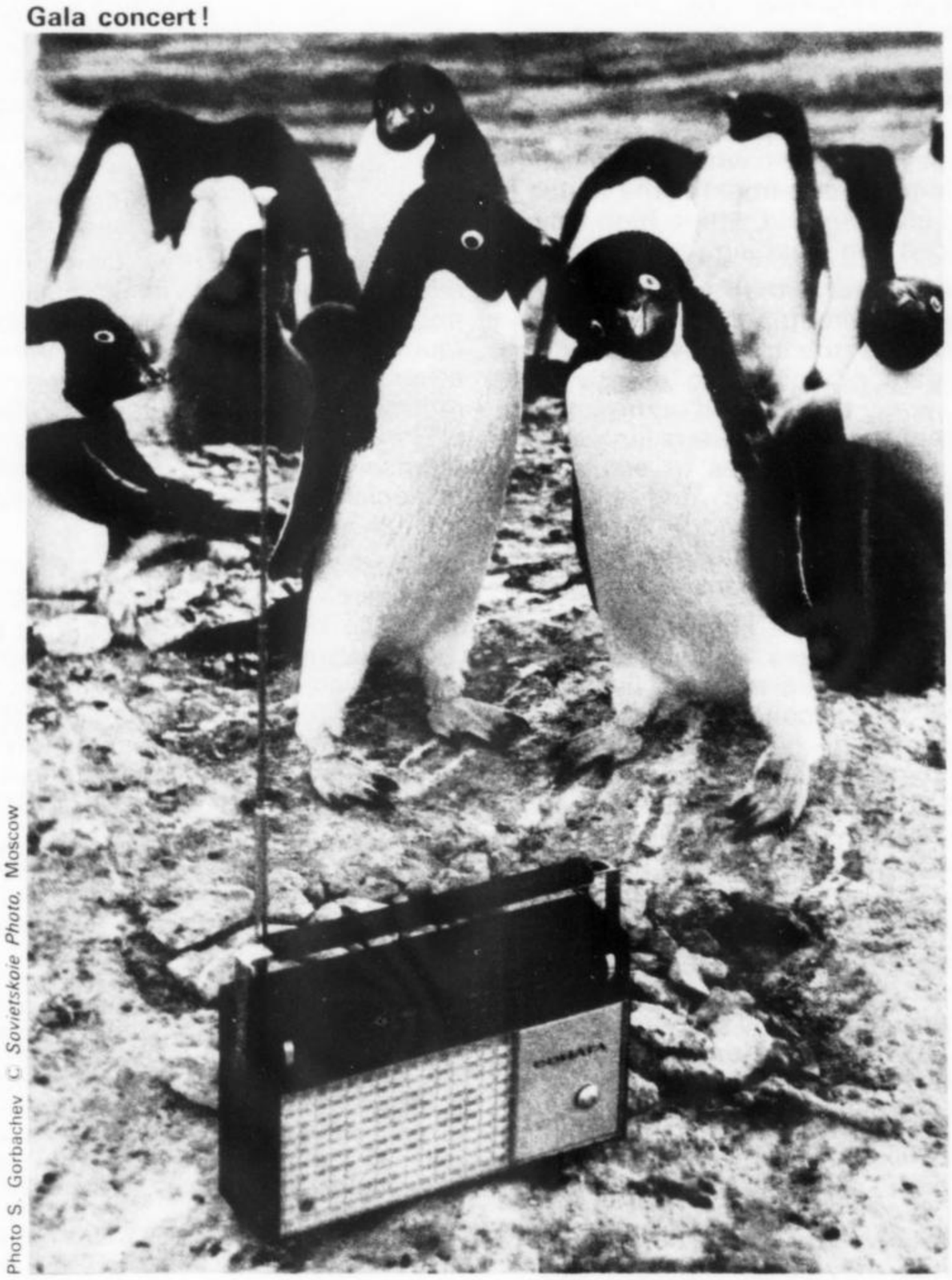


Photo S. Gorbachev © *Sovietskoie Photo*, Moscow

emotional openness to the learning of new complex acts tends to fade after puberty, and this limits the number of people who can excel in musical behaviour.

The psychiatrist thus encounters two kinds of problems around music. One has to do with musicians who cannot tolerate their minority status and who may suffer from the social isolation which results from specialization and excellence. The other problem has to do with non-musicians who for various internal and external reasons cannot participate in this foremost emotional experience and thus are cut off from one of the richest sources of human culture.

It is interesting from a historical perspective that Sigmund Freud, the psychiatrist whose ideas have had such a strong influence during the past eighty years as a result of his extraordinary literary skill and force of character, was in significant ways unmusical.

This may have stemmed in part from his early childhood. Freud became upset when his little sister started playing the piano and in a rather tyrannical way he demanded that the offending instrument be removed from the house. Later, when the world-famous psychoanalyst was consulted by musicians, including Gustav Mahler and Bruno Walter, he spent very little time with these men in contrast to the much greater attention he gave to other patients.

Nor did Freud's most creative disciple, the psychiatrist C. G. Jung, have much understanding for music, as he regretfully confessed in personal correspondence. Part of the problem may stem from the intense curiosity both of these men of genius displayed towards dreaming as a means of psychological insight.

Not only are dreams mostly visual, but the sound-effects that accompany them tend to be difficult to remember and even more difficult to talk about. During sleep, hearing tends to be directed outward into the external environment, whereas the eyes are closed and able to scan the inner, psychic milieu. Hervey de Saint-Denis, whose dream studies were published several decades before Freud's, found that different tunes played while he was asleep caused him to dream about women he had danced with to these tunes.

The composer Igor Stravinsky was able to observe how dreaming helped his creativity. One night before going to bed he was disturbed by a certain tonal interval which kept coming to mind, and he dreamt about it as an elastic substance stretched between two notes. Along with the notes he visualized testicle-like eggs, warm and protected by nests. This vision apparently reassured the composer, and after waking up he felt more comfortable about his musical ideas and whatever else had been troubling him.

I once treated a patient who, after dreaming about a theme from Bach's Saint Matthew Passion, suddenly came to the realization that he felt jealous enough to "crucify" his best friend.

SPEECH. Finally we turn to speech, the third major component of man's world of sound, one we value most for reasoning and for the communication of explicit, factual meanings.

Like music, speech begins in infancy. The mother or father follows the child's gaze to what interests him or her and teaches the child what to pay attention to and what to ignore. Objects of focussed attention are given names—e.g., Mama, milk, Daddy, toy, bed, etc.—and as the baby grows older he or she repeats the names, or verbal labels, with increasing exactness.

Connectives, adjectives, action-words, and adverbs that the child hears in the environment of speech sounds also become part of his or her verbal repertoire, partly due to an innate or biological propensity which the human brain has for making sense, and partly because the child wants to share the communicative network of a family and society. Most children achieve considerable facility in understanding and using speech before they are ten years old.

A secondary process of literalization takes place during this first decade of living in most societies, especially those which consider schools to be essential for the education of children and where high value is placed on reading and writing.

Unfortunately the acquisition of literary skills creates conflicts between the ear and the eye. No sound is ever heard or spoken in exactly the same way twice, and during the years that the child masters language, he or she also comes to enjoy the marvellously dynamic and flowing quality of speech and learns to depend on the ever-changing nuances and emotional inflections of the voice.

The speech medium consists of hisses and buzzes articulated quite rapidly, in clusters of about five morphemes per second. To represent this information nonacoustically with visual symbols requires an alphabet, and no alphabet has yet been devised that accurately and reliably translates all speech sounds.

Thus school-children are made to learn a fairly arbitrary system of letters, so arbitrary in fact that as George Bernard Shaw pointed out, the word "fish" could also be spelled "ghoti" (gh as in laugh, o as in women, and ti as in nation).

In psychiatry, we see many casualties of this kind of education. First of all there are "dyslexic" children whose brains simply rebel at the basic notions of written language so that while they speak perfectly well, they write in reverse or in typically disorganized ways, and have trouble reading.

Another group of children shows undue concern for verbal discontinuities (e.g., spaces between words play a significant role in writing but don't exist in speech). Some begin to stammer or stutter over words that ordinarily pose no problems. Dysfluent youngsters are often singled out for ridicule, punishment, or extra schoolwork. Finally there are children who withdraw from speech situations because of a sense of frustration or the fear of humiliation.

I have tried to set down a few observations about the role of sound in human affairs, dividing the acoustical world roughly into three components—noise, music, and speech. There is, of course, a considerable overlap. Thus certain musical compositions when heard for the first time may seem noisy, and speech can enter the realm of music through song.

Electronics has given science the tools to study acoustical behaviour directly, by recording sound so it can be repeated over and over, and by video-recording the body movements and facial expressions during sound-making and silent behaviour. Much of the knowledge gained from today's research probably cannot be preserved in books and journals, as was done in past centuries, but has to be transmitted through direct experience.

I have been impressed in my activities as a psychotherapist with the extraordinary versatility that patients at all ages—not only children and adolescents—display in their use and abuse of sound. Therapeutic communication consists in many ways of attempts to clarify meaning and reduce anxiety through the analysis of what people say, how they feel themselves to be in an environment of social rhythms, and what they do to each other.

Whether such knowledge will affect the search for truth and how it can influence belief is impossible to predict, but my hope is that the human ear will continue to become increasingly sophisticated in perceiving the warnings of noise, the beauty of music, and the meaningfulness of speech.

■ **Peter Ostwald**

UNESCO NEWSROOM

BOOKSHELF

RECENT UNESCO BOOKS

■ **History of Mankind: Cultural and Scientific Development: Vol. 5, The Nineteenth Century, 1775-1905,** edited by Charles Morazé. Latest (4-part) volume in a unique global history, produced under Unesco's auspices, of man's cultural and scientific development from Prehistory to the Atom Age. Published by George Allen and Unwin, London, 1976. (Parts 1 and 2, £ 15; Parts 3 and 4 £ 15 each).

■ **The Health of the Oceans,** by Edward D. Goldberg. An analysis of data on marine pollution. 1976, 172 pp. (28 F).

■ **Annual Summary of Information on Natural Disasters, No. 9, 1974.** Detailed information on earthquakes, tsunamis (seismic sea-waves) volcanic eruptions, landslides and avalanches. 1976, 99 pp. (18 F).

■ **Cross-cultural Broadcasting,** by Eduardo Contreras, James Larson, John K. Mayok and Peter Spain. A study on the political, cultural, linguistic and psychological implications of cross-cultural broadcasting. 1976, 49 pp. (6 F).

■ **Cultural Policy in the United Republic of Cameroon,** by J. C. Bahoken and Engelbert Atangana. 1976, 91 pp. (12 F); **Cultural Policy in the Republic of Zaire,** a study prepared under the direction of Dr. Bokonga Ekanga Botombele, 1976, 119 pp. (14 F). (Both published in Unesco's "Studies and Documents on Cultural Policies" series).

Culture and a new world economic order
A SPECIAL ISSUE OF UNESCO'S QUARTERLY *CULTURES*

An international round table on intellectual and cultural co-operation and a new world economic order was held in Paris last summer, as we reported in our last issue. Unesco's quarterly **Cultures** (°) has just published a special 200-page issue entirely devoted to this event.

Meeting at Unesco headquarters on the initiative of leading international non-governmental organizations, 34 statesmen, scientists, writers and artists from all parts of the world set out, under the chairmanship of Mr. Jean d'Ormesson of the Académie Française, to formulate the cultural conditions, moral attitudes and political and economic principles that should form the basis of a new world economic order. In welcoming the participants, the Director-General of Unesco, Mr. Amadou-Mahtar M'Bow, declared: "Far from being the expression of self-seeking demands, to strive for a new world order is to wager boldly and wholeheartedly on man, on his will to survive and to live a fuller life... Within this context, the efforts undertaken by Unesco, as by all the other organizations that make up the United Nations system, link up—over and above technical procedures—with the longing for a new humanism, free from exclusiveness or restriction, in which the explosive truth of the Dogon proverb that tells us that ***Man is the grain of the universe*** would be revealed."

In its last issue the **Unesco Courier** presented extracts from contributions by two of those taking part in the round table, Trygve Bratteli of Norway and Samir Amin of Egypt. **Cultures** now publishes the ensemble of the texts from the round table, presented in five major sections:

The challenge of the 20th century: Philip Noel-Baker (U.K., Nobel laureate), Alfred Kastler (France, Nobel laureate) and Sean MacBride (Ireland, Nobel laureate) outline the major problems of the 20th century: the arms race, the population explosion, environmental pollution.

Proposals for a new order: Willy Brandt (German Fed. Rep., Nobel laureate), Trygve Bratteli (Norway) and Samir Amin (Egypt) describe the major economic and political principles that could serve as models for the creation of a world order designed to promote more harmonious international relations.

Cultural identity and the new order: Each people's growing awareness of its cultural identity is a striking feature of the 20th century. Oswaldo Guayasamin (Ecuador), Joseph Kotsokoane (Lesotho), Prem Kirpal (India) and Paolo Grassi (Italy) seek to reconcile traditional cultural values with the modernization of society.

The new order in culture, society and economic life: Nine texts by economists, sociologists and scientists describe the many cultural aspects of a new economic order.

The vision of Man in a new world: Social, economic and cultural changes confront artists and writers with a new vision of Man. Here, artists, writers, theatre directors and urbanists trace the major trends in the evolution of artistic expression in the 20th century.

(°) **Cultures** (Vol. III, N° 4, 1976) Annual subscription 75 Fr. francs; Each issue 22 Fr. francs.

UNICEF greeting cards

For more than 25 years sales of UNICEF greeting cards have helped to provide food, medicines and school supplies for needy children in over 100 countries. This year's cards, offering a wide selection ranging from eight designs in mini format to a large size Collector's Edition, are now available at UNICEF sales points throughout the world. A trilingual (English, French, Spanish) UNICEF desk calendar for 1977 on the theme "The Rights of the Child" is also available. This gay winter scene—one of UNICEF'S broadly international designs for 1976—is by the German (Fed. Rep.) artist M. Beisner.

Over 50 issues of the 'Unesco Courier' on cassettes

Since June 1972 each issue of the Spanish edition of the "Unesco Courier" has been recorded on cassettes by El Libro Parlante (The Speaking Book) an official body based in Buenos Aires and connected with the Ministry of Social Welfare of the Argentine Republic. The recordings appear regularly each month and so far over 50 numbers of the "Courier" have been published, each on two cassettes. Each issue is loaned free to blind "listener-readers" whose numbers are constantly increasing. For further information write to: El Libro Parlante, Avenida de Mayo 869, 1084 Buenos Aires, Argentina.

Africacult, a Unesco TV programme

Unesco has produced a TV programme based on the culture of the Ashanti people of Ghana. "Africacult" shows how a traditional culture can continue to exist alongside a modern economy, stresses the importance of culture as a factor of economic and social development and demonstrates that cultural identity can be a powerful force for unity. Written and directed by Philip Gaunt, this 16 mm. 18 min. colour film is available in English, French, Spanish and Russian language versions. Further information from the Press and Audio-Visual Information Division, Unesco, Place de Fontenoy, 75700 Paris.

Letters to the editor

OPEN LETTER FROM NAPLES SCHOOLCHILDREN

Sir,

In the February 1976 issue of the "Unesco Courier" we read the letter presented to the Director-General of Unesco by 50 children of the primary school at Etterbeek, near Brussels, when he visited their school.

We share their ideas and their fears. And so we want to send the following letter to these children at Etterbeek:

"We ask the same questions as you: Why is there social injustice? Why are there wars? Why is there economic disorder and lack of freedom? It is perhaps because war already exists within us, in the constant duality of good and evil which so often leads us to give in to the worst instincts that degrade human nature. But we should try to resist this enemy within us, in order to understand our neighbours better and help them to develop all that is best in themselves. And we should join together in building a different society where the noblest ideals become realities in a new order based on respect for mankind and esteem for human dignity.

"We, the children of the A. Scarlatti middle school at Vico Equense, are your friends. We greet you in the name of all our classmates."

Anna Lisa, Maria Grazia, Colomba Staiano, Patricia Como, Benedetto Esposito, Antonino Caccioppoli, Andrea Celentano, Domenico Esposito, Renata Cilento
Vico Equense, Naples, Italy

REBIRTH OF PHILAE

Sir,

After reading your issue dealing with Philae (November 1974) it was with great interest and wonder that I, with a group associated with The Goulburn College of Advanced Education, Goulburn, New South Wales, Australia, visited the Philae monuments as part of a recent Middle East tour.

We were able to view this spectacular operation of the salvage of the monuments. The fact that we were actually on the coffer dam wall to see the expertise and technology being used to transfer and eventually restore these masterpieces of architecture is something I personally will never forget.

Norma Gowland
Bradfordville
New South Wales, Australia

RESEARCH DIVORCED FROM REALITY

Sir,

I recently came across Dragoljub Najman's article on conservatism in the world's universities (your June 1975 issue). Mr. Najman's comments are particularly relevant to developing countries like India.

His question "How many of those who teach in schools of engineering have ever been in charge of factory workshops or building sites?" strikes me as disturbingly poignant.

In India, teaching jobs serve merely as comfortable sinecures for those who either cannot or do not wish to join industry. Consequently, research (if any) being carried out is quite divorced from reality. Moreover, members of the teaching faculties are easily lured by publications in foreign journals. What they overlook is that Western countries have reached a stage of technological development where they can indulge in research topics which are for us a luxury we can ill afford.

Politicians' and statesmen's exhortations for science geared to the needs of society may have become hackneyed through over-use. But this need is still of over-riding importance, even though our university teachers tend not to perceive it.

I hope the "Unesco Courier" will continue to highlight issues of special relevance to developing countries.

P. R. Patnaik
Research Scholar
Indian Institute of Technology
Madras, India

APOSTLE OF THE INDIANS

Sir,

Congratulations on having published two articles on Father Bartolomé de Las Casas, the "Apostle of the Indians" (June 1975 issue). You did an admirable job in presenting to a wide public the most interesting aspects of the life of this great pioneer in the struggle for human rights.

The attitude of Bartolomé de Las Casas in America before his first conversion was virtually unknown. Now thanks to the "Unesco Courier" it has been described in many languages to readers all over the world. From this issue scholars and students can renew and deepen their understanding of the Indian and white colonization in America.

Congratulations on all you have achieved in the "Courier" over the years helping to raise our cultural level by teaching us to think and find the truth.

Jorge López Fuentes
Havana, Cuba

LEARNING TO COPE WITH STRESS

Sir,

Dr. Ivan S. Khorol's extremely topical article about stress ("Unesco Courier" October 1975) raises questions of concern to everyone and above all of course to specialists.

The scientific and technological revolution, urbanization and the growing tempo of living are placing increasingly heavy intellectual and emotional loads on people. Given these conditions, methods of reinforcing the nervous system must be sought.

The problem is a complex one, requiring the co-ordinated efforts of clinicians, biochemists, physiologists, pathophysiologists, pharmacologists and sociologists in all countries. It may be necessary to set up a single centre to co-ordinate these efforts and research, perhaps in the form of an International Stress Institue.

A. Luk
Moscow, U.S.S.R.

CZECHOSLOVAKIA'S CITY OF HUMOUR

Sir,

The article about Gabrovo, Bulgaria's "capital of humour" and its Scottish counterpart, Aberdeen, in your issue on the world of humour (April 1976) was first rate. We too in Czechoslovakia have our town of humour: its name is Kocourkov.

Although it is a fictitious place, many books have been written about the town and its inhabitants, and anecdotes about the people of Kocourkov have been told throughout Czechoslovakia for at least a century. The doings and quips of its people which amused our grandparents still set our children chuckling.

This town where clocks move backwards and the people get up to all sorts of tricks has figured in books and illustrations and was the subject of a film made in 1937.

On one occasion the people of Kocourkov welcomed the king with a red carpet. But it was too short and so as the king walked along they rolled it up behind him, meaning to lay it out again when he reached the end. In their haste, however, they entangled him in the carpet and rolled him in the mud. They also built a town hall but forgot the windows. So they let people bore holes for windows wherever they chose, until the building looked like a giant Gruyère cheese.

Kocourkov, Czechoslovakia's imaginary counterpart to Gabrovo, transmits good humour and optimism and symbolizes honest self-criticism.

Vladimir Kriz
Jihlava, Czechoslovakia

CHILDREN'S CONTEST FOR UNESCO'S 30 YEARS

Sir,

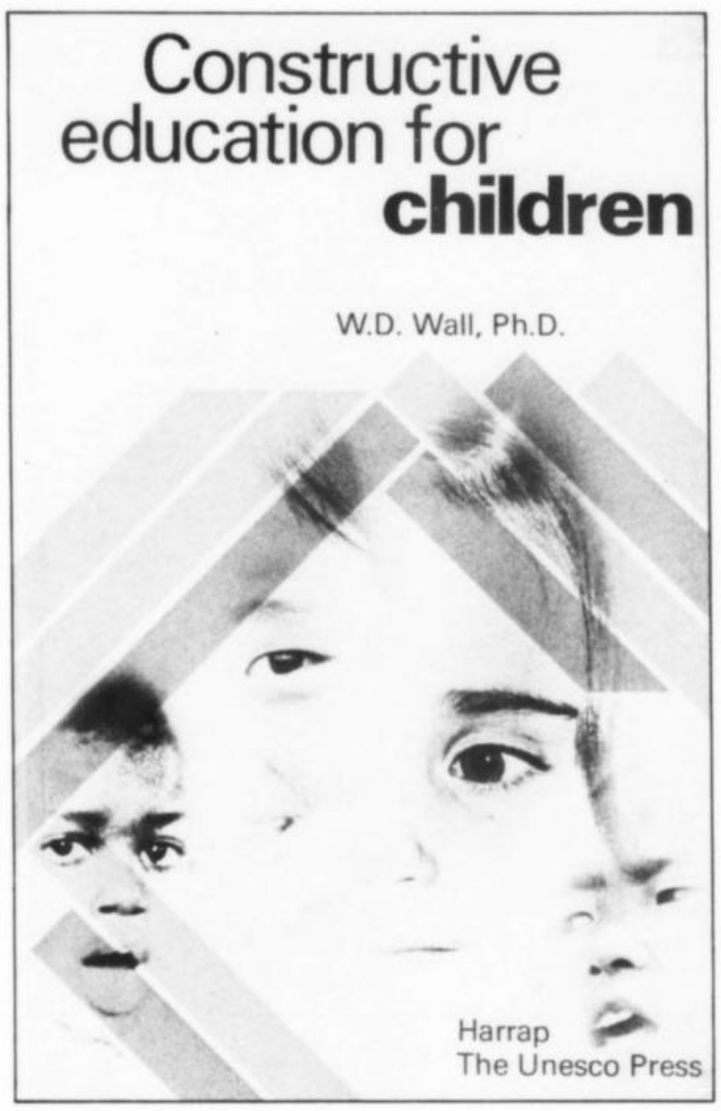
A regular reader of the "Unesco Courier" for over 20 years, I have recently been organizing a competition on Unesco for primary and secondary schoolchildren in Villepinte. The contest has been launched as part of our town's cultural activities programme and is intended to mark the 30th anniversary of Unesco's foundation.

Working in pairs, the children will be asked to compile dossiers on Unesco and its activities using documentary material and adding their own descriptions and commentaries.

The competition opened on 1 October 1976 and the closing date is 31 December. The winning entry will be published in a booklet which we distribute quarterly to all our local clubs and associations.

C. A. Leroy
President,
Municipal Cultural Committee
Villepinte, France

Imp. BRODARD et TAUPIN, COULOMMIERS — Dépôt légal C 1 — Novembre 1976 — IMPRIMÉ EN FRANCE (Printed in France)



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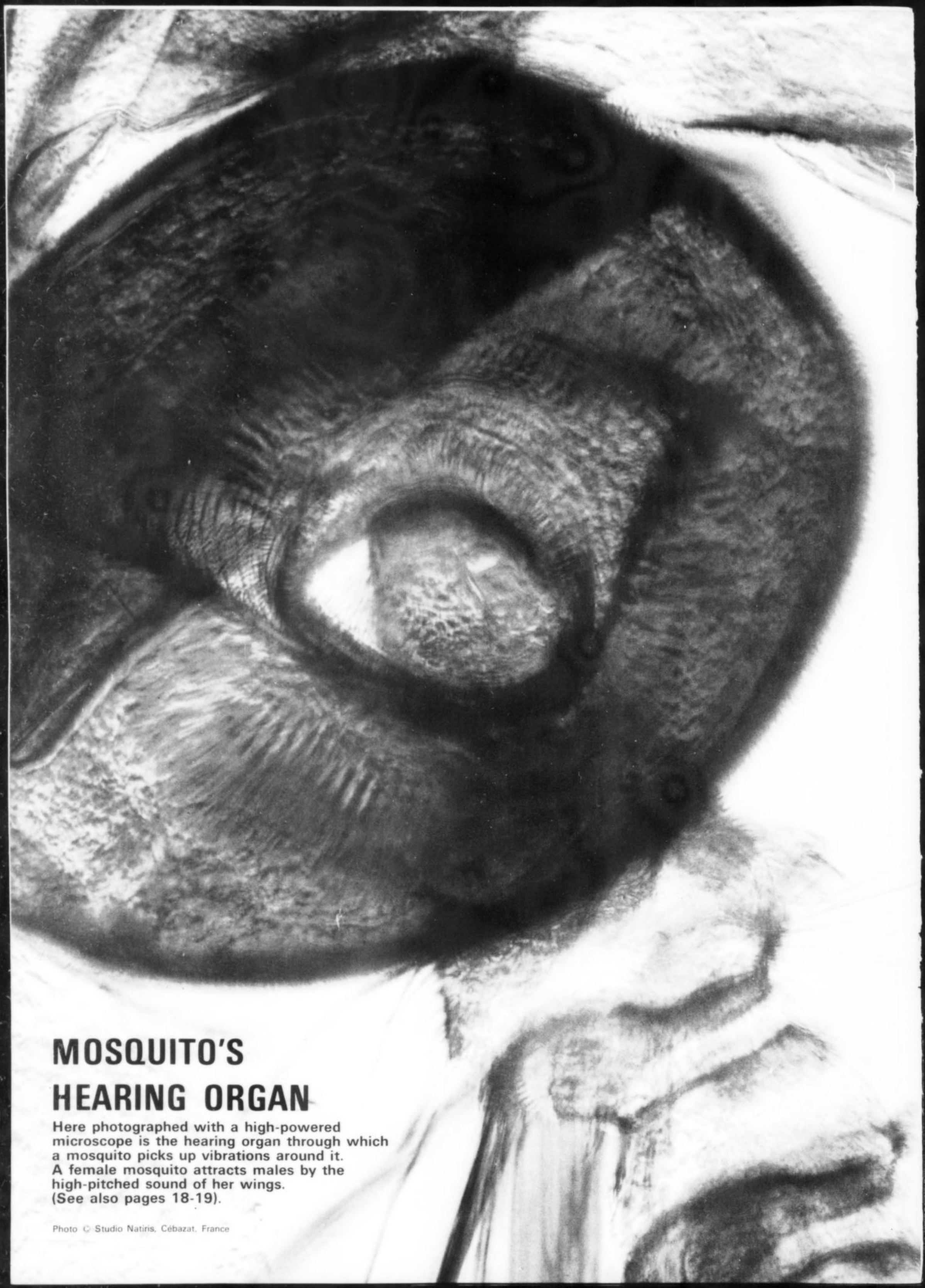

MOSQUITO'S HEARING ORGAN

Here photographed with a high-powered microscope is the hearing organ through which a mosquito picks up vibrations around it. A female mosquito attracts males by the high-pitched sound of her wings.
(See also pages 18-19).

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